*DRIVE DRIVE*

*9483 AT BFA = FORMATTER IN TAPE DRIVE 5mB XFER RATE*
*2490 BFA USES DIFFERENTIAL*

# SI2480 CARTRIDGE TAPE
*= DRIVE & I&IG FORMATTER*
# SUBSYSTEM USER GUIDE

## PB8100-9001-005

*CHECK CODE = FROM SOFTWARE*
*5X:20R = DIAG TEST FAILURE.*

*(BASF HAD BAD BATCH OF TAPES*
*(DATA OVER RUN ERRORS DIRTY HEADS*
*(SOFTWARE SETTINGS S.9)*

# WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this manual may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which the user at his own expense will be required to take whatever measures may be required to correct the interference.

This digital apparatus does not exceed the Class A limits for radio noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'est pas de bruits radioelectriques depassant les limtes applicables aux appareils numeriques de Class A, prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministere des Communicatios du Canada.

# PROPRIETARY STATEMENT

System Industries has prepared this manual for use by System Industries personnel, licensees, and customers. The information contained herein is the property of System Industries and shall neither be reproduced in whole nor in part without prior written approval from System Industries.

System Industries reserves the right to make changes, without notice to the specifications and materials contained herein, and shall not be responsible for any damages (including consequential) caused by reliance on the material as presented, including, but not limited to, typographical, arithmetic, and listing errors.

The following are trademarks of Digital Equipment Corporation:

BA23, BA123, DATATRIEVE, DEC, DECnet, DECservice, DECSYSTEM- 20, DECtape, DECUS, DECwriter, DIBOL-83, DSM-11, FMS, HSC50, FORTRAN IV, HSC70, IAS, Internet, LA, Letterprinter 100, Letterwriter 100, MASSBUS, MicroPDP-11/23, MicroPDP-11/73, MicroPower/Pascal, Micro/RSTS, MICRO/RSX, MicroVAX I, MicroVAX II, MicroVMS, OMNIBUS, Packetnet, PDP, PDT, Professional, Q-bus, QBUS, RA, Rainbow, ReGIS, RSTS, RSX, RT, SBI, SDI, UDA50, UNIBUS, ULTRIX, VAX, VAXELN, VMS, and VT.

UNIX is a trademark of AT & T Bell Laboratories.

# REVISION RECORD

| REVISION NUMBER | DATE | DESCRIPTION | EO NUMBER |
|---|---|---|---|
| 001 | 01/26/90 | Preliminary Release | 6339 |
| 002 | 02/13/90 | Initial Release | 6399 |
| 003 | 04/12/90 | Data Compression and Auto Loader Release | 6458 |
| 004 | 12/12/90 | Technical Corrections | 6685 |
| 005 | 04/20/93 | Added Vendor Material to Chapter 5 | 7233 |

# TABLE OF CONTENTS

**Section**                                                                        **Page**

# TABLE OF CONTENTS

**Section**                                                                        **Page**

# LIST OF ILLUSTRATIONS

**Figure**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**Page**

# LIST OF TABLES

**Table**                                                                          **Page**

# 1
# INTRODUCTION

*SI2480 Cartridge Tape Subsystem User Guide* explains how to install, operate, and maintain SI2480 Subsystem configurations. The manual contains seven chapters listed in Table 1-1.

Table 1-1. SI2480 System User Guide Chapters

| SECTION | DESCRIPTION |
|---|---|
| Chapter 1: Introduction | Contains the manual audience, related publications, conventions, terms list, and materials needed. |
| Chapter 2: SI2480 Subsystem | Describes the system components and their features, as well as its requirements and functions. |
| Chapter 3: Preinstallation | Discusses technical specifications, site concerns, and initial unpacking. |
| Chapter 4: Installation | Provides procedures for the installation of an SI2480 Subsystem. |
| Chapter 5: Operation | Explains the daily operation of the SI2480 Subsystem and message displays, and has notes on how to handle cartridge tapes. |
| Chapter 6: Maintenance and Troubleshooting | Provides system verification and basic maintenance and troubleshooting procedures. |
| Chapter 7: Illustrated Parts Catalog | Contains a parts list table and illustration of components used in SI2480 configurations. |

## 1.1 Manual Audience

*SI2480 Cartridge Tape Subsystem User Guide* is intended for System Industries Customer Service Engineers and self-maintenance customers. Familiarity with VMS and ULTRIX operating systems, along with understanding the fundamentals of DEC networks, computers, and drive operations, is required.

## 1.2 Related Publications

Additional information on the SI2480 Subsystem and its related configurations is provided in publications listed in Table 1-2.

Table 1-2. Related Publications

| PUBLICATION NUMBER | TITLE |
| --- | --- |
| PB8720-9001 | STORAGE DIRECTOR USER GUIDE |
| PB6500-9001 | THETA SERIES CABINET USER GUIDE |
| PB9904-9014 | SIDOS USER GUIDE |
| PB5000-9210 | ULTRIX SUPPORT MANUAL V2.0 - 2.2 |
| PB5000-9211 | ULTRIX SUPPORT MANUAL V3.0 |
| 982-2521-001 | CARTRIDGE TAPE CONTROLLER CE MANUAL |
| 982-2522-001 | CARTRIDGE TAPE CONTROLLER OEM MANUAL |
| 982-2523-001 | CARTRIDGE TAPE DRIVE CE MANUAL |
| 982-2524-001 | CARTRIDGE TAPE DRIVE OEM MANUAL |
| PB6050-9010 | US1000 USER GUIDE |
| PB6051-9001 | QS1000 USER GUIDE |

## 1.3 Manual Conventions

Refer to the following documentation conventions as a guide to using this manual.

- Typed computer entry is shown in **boldface.** Type all boldface characters exactly as they appear. For example:

  Type: **SHOW DEV**

- Screen messages are displayed in a different typestyle, as follows:

  Printer attached to terminal? (Y/N) [N]:

- Key names are in boldface and shown in angle brackets. For example:

  <RETURN>
  <TAB>
  <CTRL> c

- Interactive sequences that include computer input and output are shown as follows:

  Printer attached to terminal? (Y/N) [N]: Y
  Initializing...

- Variable typed entries, or text you must replace, are shown in *italics*. In the following example

  Type: **COPY M***xx***:\*.\****xxxxx*::\***/LOG <RETURN>**

  *xx* and *xxxxx* are italicized and replaced with the actual device type and name.

- Three types of notes are used in this manual: a standard NOTE, a CAUTION note, and a WARNING note.

## NOTE

The standard NOTE highlights important or additional information.

## CAUTION

The CAUTION note is used for situations that are potentially dangerous or destructive to data.

## WARNING

A WARNING note is required if system failure or bodily injury could be involved.

## 1.4 Terms List

The terms list provides definitions and usage information for System Industries and industry-standard terms and acronyms used in this manual.

| | |
|---|---|
| ANSI | Acronym for the American National Standards Institute. |
| bpi | Bits per inch; recorded serially in one tape track. |
| BOT | Beginning Of Tape; a set of LEDs noting length of remaining tape on tape cartridge. |
| CPU | Central Processing Unit; a computer. |
| DEC | Digital Equipment Corporation. |
| Density | Number of logical bits (0s and 1s) stored per unit length. |
| DMA | Direct Memory Access; a method of data transfer that does not involve the CPU, thereby freeing the CPU for other tasks. |
| DSA | Digital Storage Architecture; a DEC standard architecture used in the design of I/O Subsystems. |
| ECC | Error Correction Code; a means for repairing data fields. |
| EDC | Error Detection Code; a means for verifying integrity of data fields. |
| EMI | Electromagnetic Interference. |
| ESD | Electro-Static Discharge. |

| | |
|---|---|
| FCC | Federal Communications Commission; the organization responsible for regulating communications. |
| FCI | Flux Changes per Inch; the actual magnetic flux changes per inch on tape. |
| FCU | Format Control Unit |
| FRU | Field Replaceable Unit; the repair assembly level. |
| Gbyte | Gigabyte; a billion bytes of data (1,000 Mbytes). |
| HSC | DEC's Hierarchical Storage Controller. |
| I/O | Input/Output; a data path. |
| ips | Inches per second; a measure of tape transport speed. |
| LED | Light Emitting Diode; an indicator light. |
| MByte | Megabyte; a million bytes of data (1,000 Kbytes). |
| MTA | Magnetic Tape Adaptor; a device that adapts a host or controller to a different industry-standard interface and emulates a particular host system. |
| MTBF | Mean Time Between Failures; a measure of device reliability. |
| MTC | Magnetic Tape Controller; the controller/formatter device in a tape system. |
| MTTR | Mean Time To Repair; a measure of ease to detect, isolate, and repair failures. |
| MTU | Magnetic Tape Unit; the tape handling device (drive). |
| NEMA | National Electronic Manufacturing Association; a professional standards organization. |
| NRZ | Nonreturn to zero. |
| PCA | Printed Circuit Assembly; with electronic components assembled. |
| PCB | Printed Circuit Board; without electronic components assembled. |
| PDU | Power Distribution Unit; a means of distributing AC power. |
| RA | Digital Equipment Corporation's tape drive family used with DSA controllers. |
| RFI | Radio Frequency Interference. |

| | |
|---|---|
| RTZ | Return to zero. |
| SCSI | Small Computer System Interface; a standard interface for disk and tape drives. |
| SI | System Industries. |
| SIDOS | System Industries Diagnostic Operating System; a diagnostic program developed by SI for disk and tape subsystems. |
| STI | Standard Tape Interface; referring to interface itself or interface cables that support transfer of data and commands to and from a DEC HSC Controller. |
| TA | DEC's tape drive family used with DEC HSC Controllers. |
| TMSCP | Tape Mass Storage Control Protocol. |
| VAX | Virtual Address eXtension; a DEC CPU. |

## 1.5 Materials Needed

Installation procedures described in this manual require a standard tool box. Service procedures for drives installed in a SI Theta cabinet require the cabinet front panel key. For removal or insertion of a Fujitsu PC Board, use the supplied tools.

Verification and repair procedures may require the use of SI diagnostic program SIDOS.

# 2
# SUBSYSTEM COMPONENTS

This section describes the SI2480 Cartridge Tape Subsystem configurations, features, and components. The SI2480 system is a compact, low-cost mass storage device, developed to provide traditional tape backup and processing. The SI2480 tape system is used with any device that supports the 2480 SCSI protocol. Specifications and environmental considerations are listed in "Preinstallation Considerations."

The SI2480 Cartridge Tape System includes from one to four cartridge tape drives with SCSI interface. The SI2480 is IBM 3480 media-compatible. The SI2480 is shown in its operating environment in Figure 2-1.
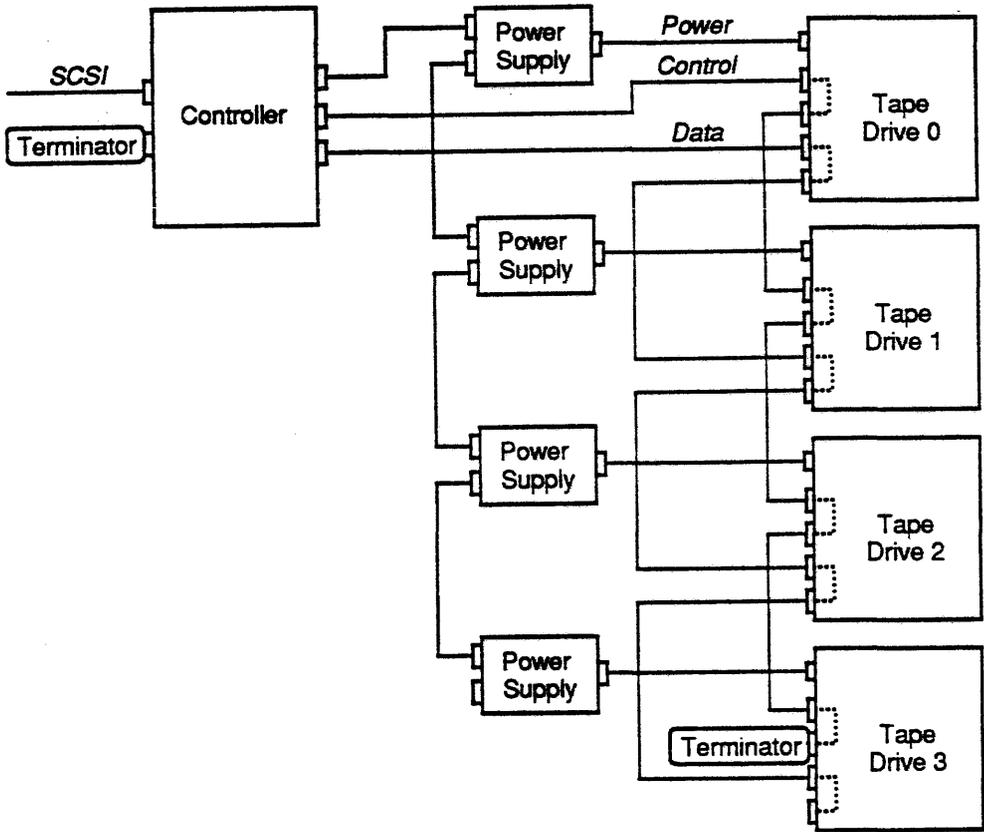
Figure 2-1.  SI2480 Operating Environment

## 2.1 SI2480 Subsystem Features

The following list describes the SI2480 system features:

- DEC TA90 - IBM 3480 data interchange
- Uses standard IBM3480 format 200-Mbyte cartridges (ISO-X3B5)
- Recording of more than 200 Mbytes per cartridge with data compression
- 2-Mbyte data buffer
- Extensive error recovery procedures ensure data integrity
- Autoloading, operator message display, and self-diagnostics panel
- 15,000+ hours transport MTBF and 50,000+ hours controller MTBF
- Ability to read large host data blocks
- Expandability from one or two drives housed in one rack to three or four drives in two racks.

## 2.2 Subsystem Configurations

The SI2480 Subsystem is contained in two standard 19-inch racks; one for the controller and one for the drive (s). Both the drive and controller units measure 17.5 inches wide by 5.5 inches high by 27 inches deep.

The SI2480 Subsystem is supported on any CPU system that connects to the DEC HSC product. This includes HSC40, HSC50, and HSC70. The SI2480 Subsystem is also supported on CPU systems that have a Unibus via the US1000 Controller, and on CPU systems that have a Q-bus via the QS1000 Controller.

The SI2480 drive tray supports one or two SI2480 tape drives connected to the same controller or two SI2480 tape drives connected to separate controllers.

Standard configurations include one FCU - Format Control Unit supporting one to four drives or two FCUs; with one FCU supporting up to four drives, the second FCU supporting up to two drives. For configurations with three or four drive units, a second 19-inch drive tray is required. The SI2480 Subsystem, shown in both a 42-inch and 60-inch cabinet, is illustrated in Figure 2-2.

**NOTE**

1. Due to FCC-compliance requirements, the SI2480 Controller must be located directly above or directly below the Storage Director Chassis when connecting to a DEC HSC.
2. Due to controller requirements, only one SI2480 transport per SI2480 FCU when connecting to a QS1000 or US1000.

The SI2480 Subsystem is supported by SIDOS from any VAX/VMS operating system CPU. It also runs DEC HSC diagnostic ILEXER without restrictions.

2-2
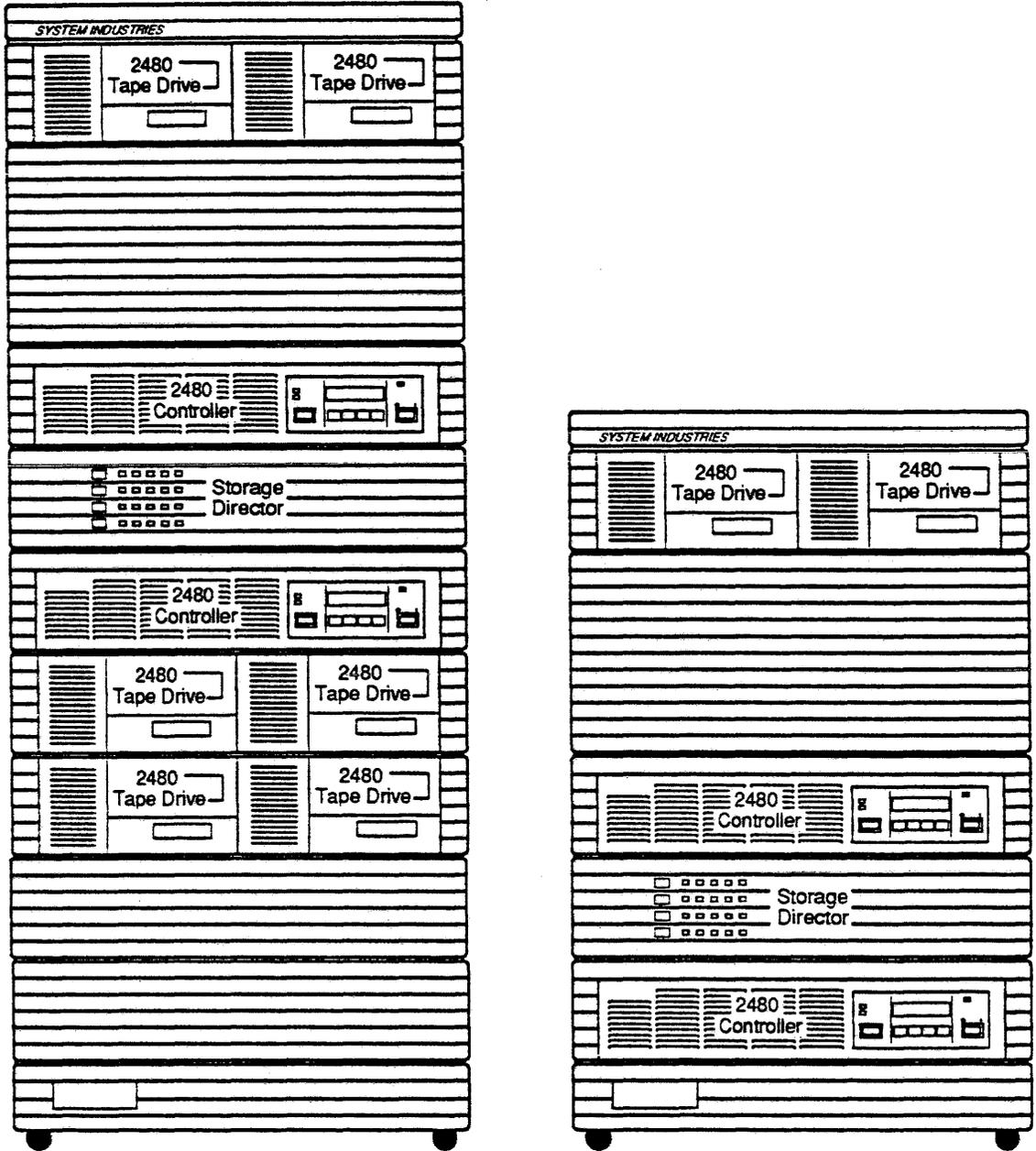
Figure 2-2.  SI2480 Cartridge Tape System in Cabinet

## 2.3   SI2480 Front Panels

The front panel of the SI2480 FCU contains a combination operator panel and maintenance panel. As operational controls, the panel contains a power on/off switch for the controller, the on-line/off-line switch for the SCSI interface, and status indicators.

The front panel of the SI2480 Tape Drive contains: indicators for attention, selected, and compression; operational switches for compression, test, start, unload, and reset; and seven LEDs indicating remaining tape. The function of these controls on both units is described in "Operation."

For configurations with only one drive, a metal drive plate is installed covering the second drive position. The SI2480 Subsystem front panels are shown in Figure 2-3.
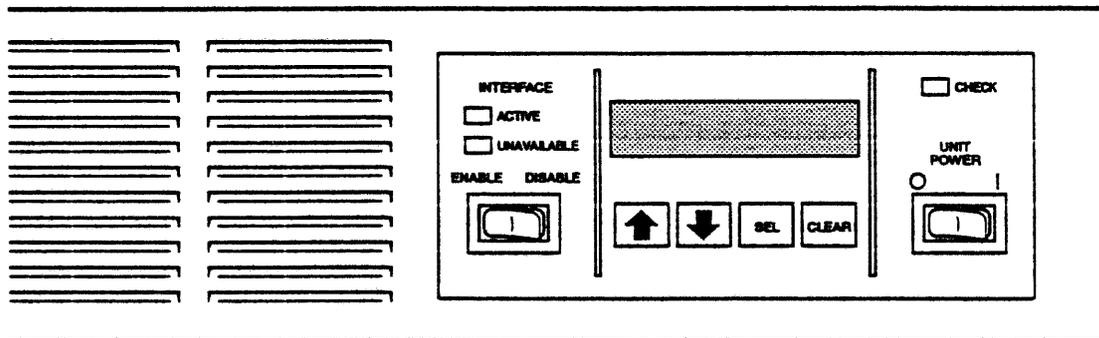


Controller
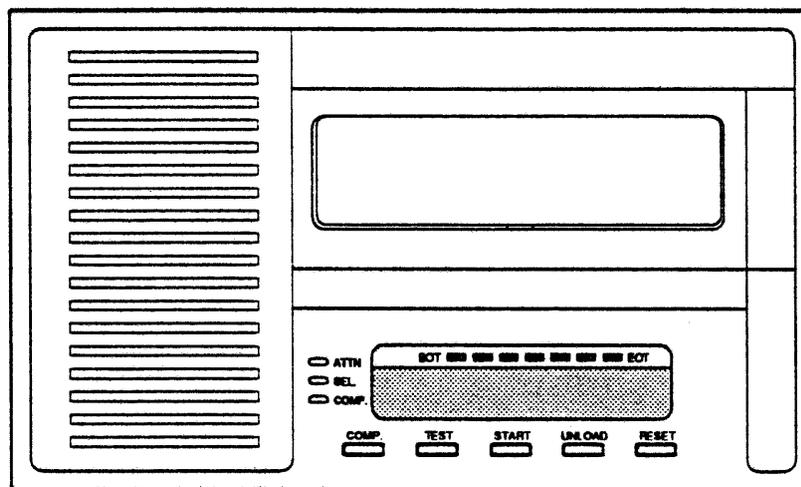


Drive

Figure 2-3.  SI2480 Subsystem Front Panels

## 2.4 SI2480 Subsystem Components

The major components of the SI2480 Cartridge Tape Subsystem are.

- SI2480 Format Control Unit (FCU)
- SI2480 Tape Drive Chassis
- SI2480 Stacker/Loader

### SI2480 FCU

The FCU consists of an interface circuit, a mechanical control circuit, and a read/write circuit, which are all controlled by two microprocessors. An SI2480 FCU is shown in Figure 2-4.

The SI2480 FCU contains its own power supply and power control. The FCU power switch is located on the front panel and controls power to all attached drives.

The AC voltage for the controller is between 100 and 120 VAC or between 200 and 240 VAC, single-phase between 47 Hz to 63 Hz. A change in voltage requires a change within the power system. For the power conversion option, refer to "Maintenance and Troubleshooting."

**NOTE**

The AC power switch is separate from the DC power control switch on the controller front panel that controls DC output of the power supply.
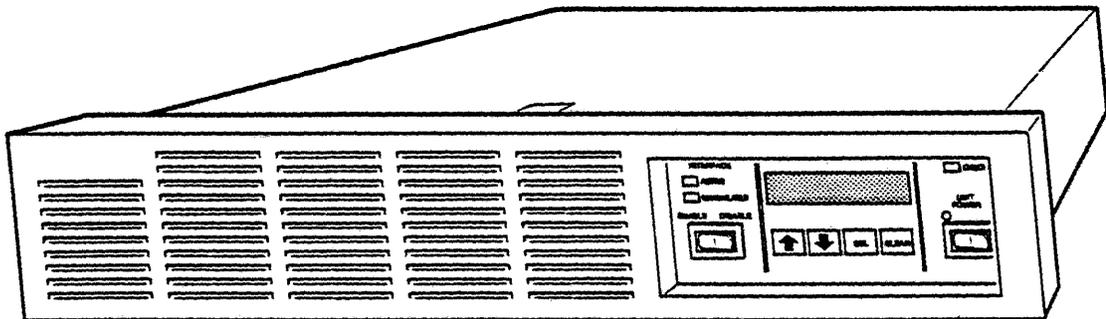


Figure 2-4.  SI2480 Controller

## Data Compression:

The SI2480 Subsystem data compression is a single PCA that can double the storage capacity of a 2480 Cartridge Tape. Each 2480 FCU supports up to four 2480 Tape Drives, with each drive independently using the data compression mode.

When the data compression mode is installed, compression is enabled by the controller based on an operator action (presence of special label on the cartridge or the compression switch on drive enabled).

Compressed tapes are recognized by the tape drive and formatter with no operator action required. If the tape is not at BOT, writes are either compressed or noncompressed, depending on the indication in the density identification mark. This allows the tapes to not have mixed files of compressed and noncompressed data.

### NOTE

Tapes written in compressed mode are not compatible
with the DEC TA90 or IBM 3480 Tape Subsystems.


For more information on the compressed mode, refer to the vendor manual.

## SI2480 Tape Drive Chassis

The tape drive chassis major components include:

- Cartridge Tape Drive
- Cartridges
- Internal Cabling
- Power Supply

## Cartridge Tape Drive

The SI2480 Cartridge Tape unit is connected to an SI2480 Tape FCU and writes data on and reads data from a cartridge type magnetic tape. The tape is chromium-dioxide coated and is capable of about 15,000 uses.

The drive has a cartridge loading mechanism, a tape feeding mechanism, a data read/write mechanism, and a microprocessor to control these mechanisms. Drive function is controlled through the front panel. These functions are described in "Operation." An SI2480 Cartridge Tape Drive is shown in Figure 2-5.
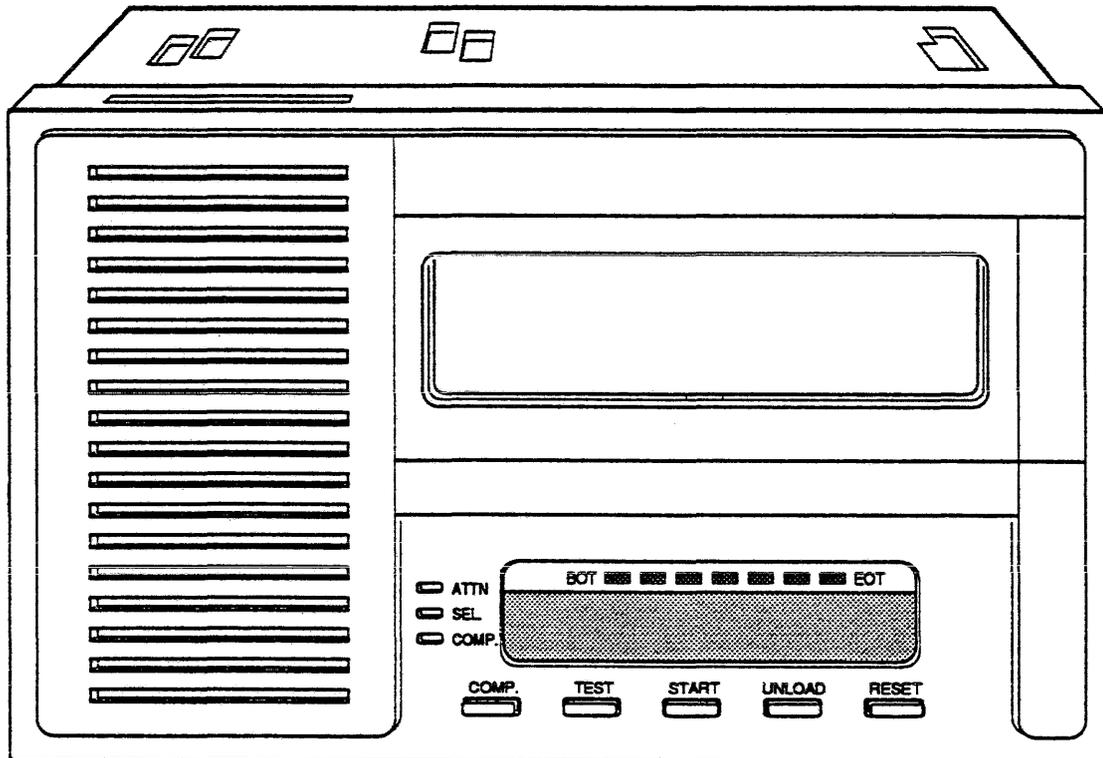
Figure 2-5.  SI2480 Cartridge Tape Drive

## Cartridges

The cartridge tape drive has an autoload/unload feature.  This loader consists of three position sensors, three identification sensors, and a drive motor.  After a cartridge is inserted through the port on the front cover and detected by sensors, the cartridge is moved to a position where read/write operations are performed.

During the loading operation, the cartridge is moved by the cartridge loader, and the tape is pulled out of the cartridge by the threading mechanism.  The tape feeding mechanism incorporates a direct reel drive control that accelerates, decelerates, or stops tape feeding.

The data/read mechanism has integrated read and write heads that enable the data to be checked for read errors while it is being written.  For more information on operating these functions, refer to "Operation."

**NOTE**

Make sure metal sticker indicators are applied for
cartridges running in the compression mode.

## Cabling

Up to four drives can be connected to one FCU. Three types of cables are used: the control data cable, which transfers the command and write data; the read data cable, which sends read signals to the controller; and the control power cable, which controls power for the drives. These cables are connected in a daisychain.

A terminating resistor must be connected to the control cable of the last tape unit in a series. A terminating resistor is not required for the data cable. For more information on cabling, refer to "Installation."

## Power Supply

The power supply for the SI2480 Tape Drive measures 4 inches high by 8 inches deep by 7 1/2 inches wide and provides three functions:

- Supplies stable DC to loads on the basis of the switching control system.
- Protects loads and itself with an overvoltage/overcurrent detection circuit.
- Automatically switches input voltages, controls AC on/off timing, and displays error messages with a control circuit.

The AC voltage is between 100 and 240 VAC, single-phase between 47 Hz to 63 Hz. For the power conversion option, refer to "Maintenance and Troubleshooting."

The mainline power switch, located on the rear panel, provides On/Off control of the controller AC input voltage. The default for this switch is UP. This default position requires the controller to maintain power to the drives. Refer to "Operation" for more detail on the functions of the power supply.

Each drive must have its own power supply. Two drives and two power supplies fit in one drive tray. Information on cabling the drives to the power supply are found in "Installation." The power supply for the drives is shown in Figure 2-6.
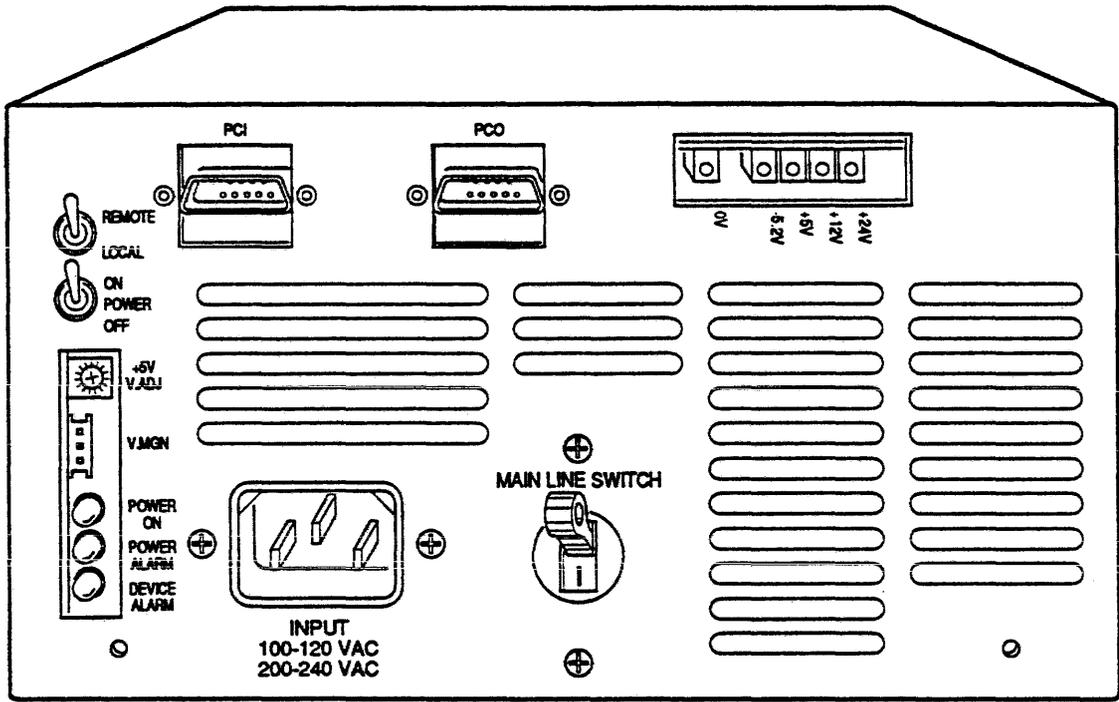
Figure 2-6.  SI2480 Cartridge Tape Drive Power Supply

## SI2480 Stacker/Loader

The SI2480 Stacker/Loader allows the user to load up to five or 10 tape cartridges. This gives the user 1 to 2 Gbytes of unattended backup operations on a single tape transport.

The loader measures approximately 8.5 inches wide by 5 inches high by 9 inches deep. The SI2480 Stacker/Loader with full magazine is shown in Figure 2-7.

THUMB WHEEL
FOR MAGAZINE REMOVAL
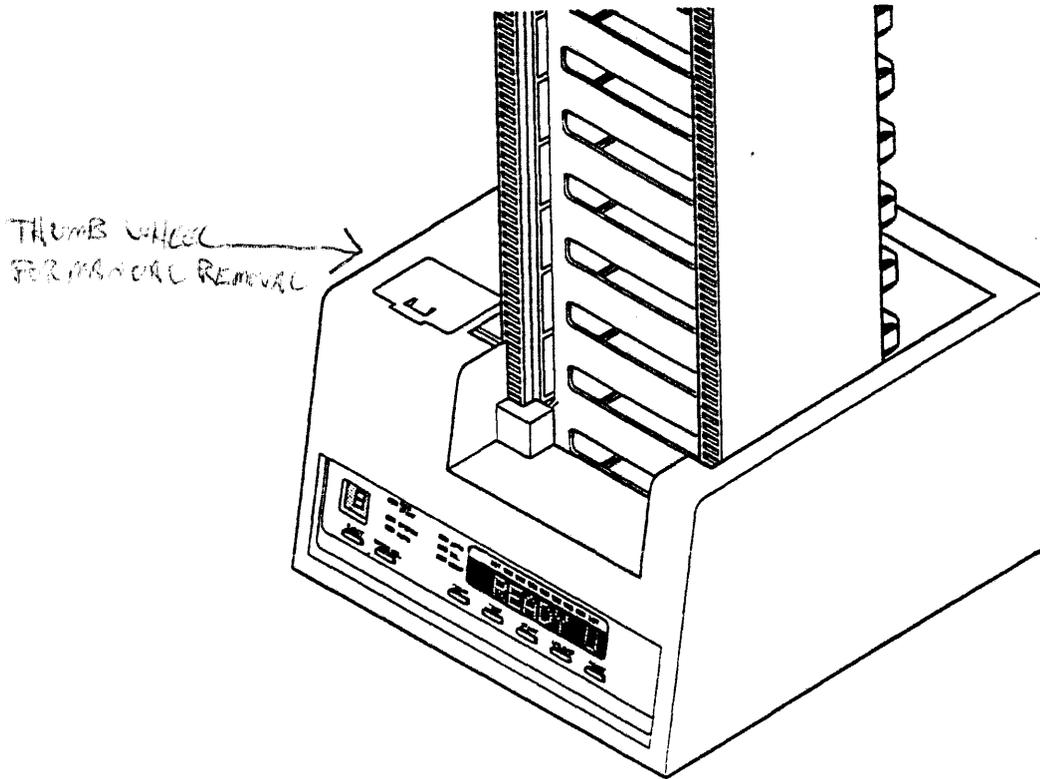
Figure 2-7.  SI2480 Stacker/Loader With Magazine

## Stacker/Loader Front Panel

The front panel of the SI2480 Stacker/Loader contains: indicators for attention, selected, compression, magazine start, system, and auto; operational switches for compression, test, start, unload, reset, mode select, and eject; seven LEDs indicating remaining tape; and a numeric LED indicating cartridge number. The function of these controls is described in "Operation."

A front panel is shown in Figure 2-8.  The dotted box indicates the original SI2480 Tape Drive front panel.
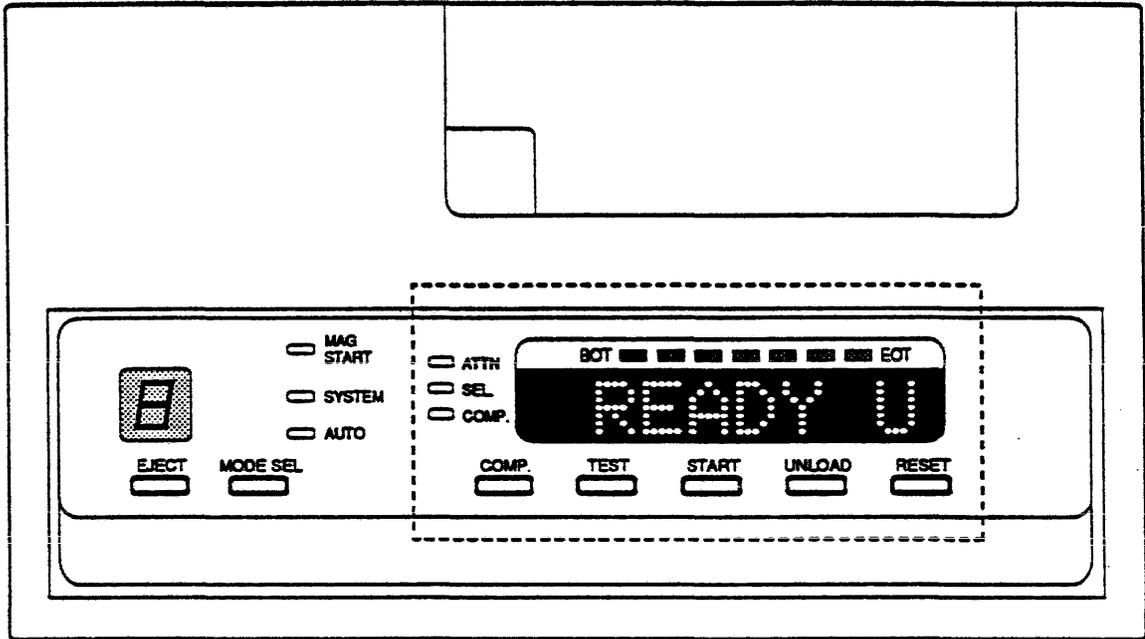
Figure 2-8.  SI2480 Stacker/Loader Front Panel
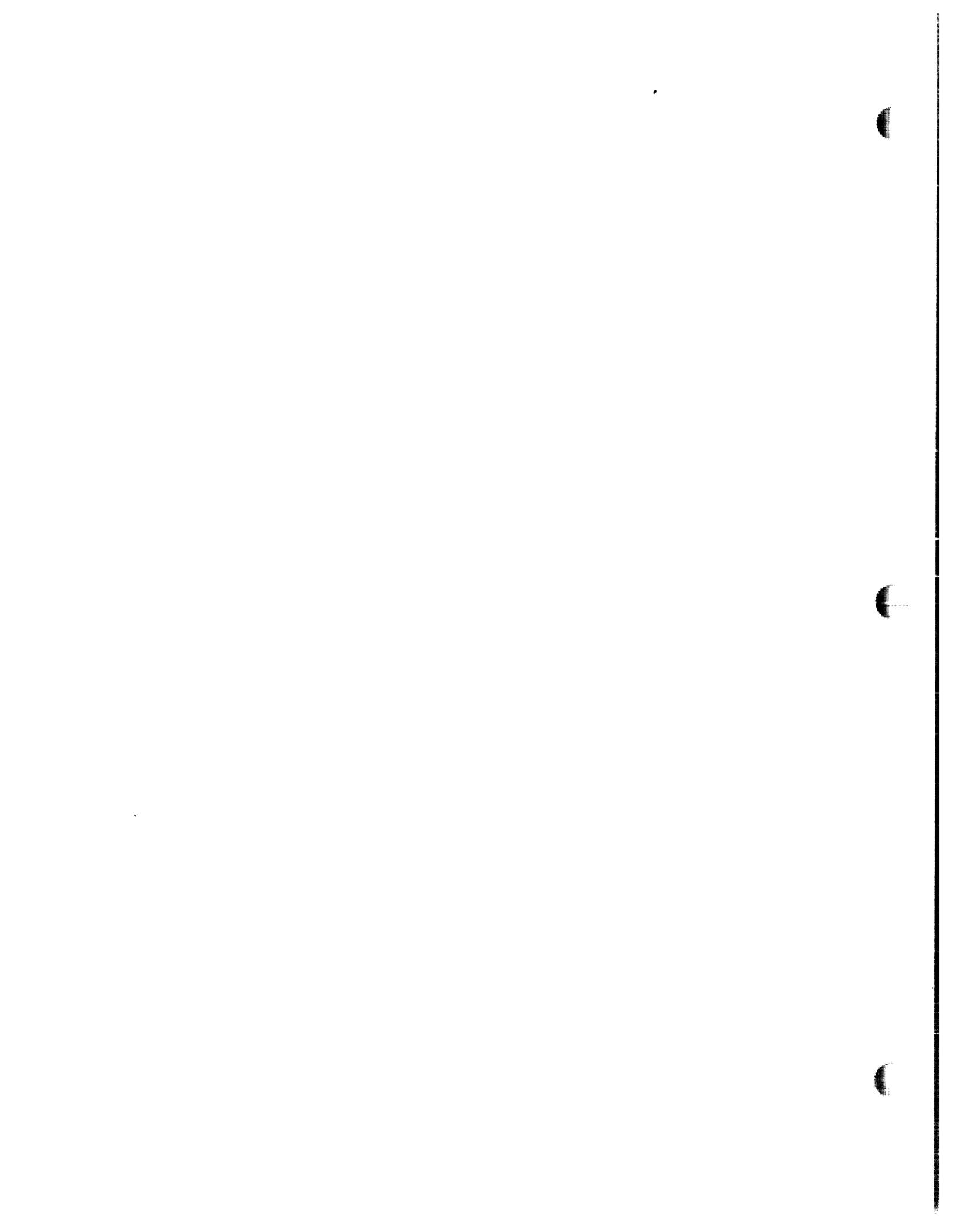
# 3
# PREINSTALLATION

Before unpacking the equipment or beginning the installation procedure, review the specifications, and verify the site considerations and power requirements discussed in this section are met. Cautions and considerations during unpacking are also discussed.

## 3.1 Environmental and Physical Specifications

The following considerations must be met to maximize equipment life and reliability.

**Space**              Space allocation includes actual physical space required by the unit and additional requirements for service clearance, as well as installation access.

Minimum service clearance is three feet in front and behind the cabinet. Connecting cables need ample slack to allow repositioning of components during service.

**Temperature**        Ideal computer room temperature is 68 - 70° F (20° C), with a range of 65 - 75° F considered acceptable. When adding a tape storage subsystem to an existing installation, determine the additional load on air conditioning.

**Humidity**           Humidity should be maintained in the range of 35 - 60% relative. Controlling humidity avoids the problems of static electricity or condensation.

**Fire and Safety**    Fire extinguishing systems should be in place. Confirm with the system manager that adequate fire precautions have been met.

**Electrostatic Discharge**  Static electricity is potentially dangerous to certain equipment. Static can be minimized with the use of special antistatic rugs or mats, chairs, and wrist-straps; maintaining humidity at 40 - 60%; and careful bonding of equipment frames.

The physical specifications for the SI2480 are listed in Table 3-1.

Table 3-1. SI2480 Physical Specifications

| | |
|---|---|
| **Controller Interface** | Small Computer System Interface (SCSI) |
| **Software Compatibility** | Tape Mass Storage Control Protocol (TMSCP) |
| **Number of Drives** | 1 to 4 |
| **Data Buffer** | 2 Mbytes |
| **Cartridge Capacity** | 200 Mbytes (with 24 Kbytes records) |
| **Drive Addresses** | 0 to 399 |
| **Tape Speed** | Nominal — 78.7 ips<br>Rewind — 158 ips |
| **Linear Recording Density** | Flux — (all zero) 1944 ftpmm<br>        (all ones) 972 ftpmm<br>Bit —37,871 bpi |
| **Number of Tracks** | 18 |
| **Data Reliability** | Write — $1.0 \times 10^8$ bits<br>Read — $1.0 \times 10^9$ bits (soft error)<br>    — $1.0 \times 10^{11}$ bits (hard error) |
| **Physical Dimensions**<br>(2 drives)    (1 controller) | Width — 17.4 inches    17.4 inches<br>Height — 5.25 inches    3.5 inches<br>Depth — 24.0 inches    22.5 inches<br>Weight — 75 pounds    46 pounds |
| **Temperature Range** | +5 to $40^\circ$ C ($41^\circ$ to $90^\circ$ F) |
| **Relative Humidity**<br>        (operating) | 20 to 80% noncondensing |
| **Shock** (maximum)<br>        **nonoperating**<br>        **operating** | 20 Gbytes for 10 milliseconds<br>2 Gbytes for 10 milliseconds |
| **Power Requirements** | 100-120 VAC, 60 Hz, 3.0 Amps<br>200-240 VAC, 50 Hz, 1.6 Amps |
| **MTBF** | 15,000 hours drive<br>50,000 hours controller |
| **MTTR** | 30 minutes |

## 3.2 Power Requirements

### AC Power

The SI2480 Subsystem requires AC power to operate.

### AC Neutral

Be careful not to confuse AC neutral with protective or frame ground. Frame ground prevents the buildup of dangerous voltages on equipment and protects personnel. It ensures that any short circuit between a power phase and the cabinet draws enough current to trip the circuit's protective device immediately, rather than raising the potential of the equipment to a dangerous level. Additionally, frame ground prevents spurious noise from entering the line. Never connect AC neutral to the frame of any equipment or the protective ground (except at the building's main electrical service entrance).

Neutral and safety ground are often connected together by the NEMA receptacles or at the circuit breaker neutral bus bar. Try to isolate neutral from safety ground in the circuit breaker box and ensure that conduit pipes are also isolated from other possible ground connections. Ideally, the equipment frame ground is isolated from neutral and other ground sources all the way back to the building main grounding rod.

### AC Earth Ground

Be sure to maintain an adequate earth ground. If there is any question, perform an impedance test to ensure ground potential is less than 10 ohms. Refer to a grounding reference for measurement and grounding methods.

Typically, an earth ground suitable for computer equipment and peripherals consists of a 0.625-inch diameter copper rod driven into the earth to a depth of at least 12 feet. Since soil is quite variable in conductivity, chemicals such as salt or magnesium sulfate are added to the soil surrounding the rod to a depth of 2 feet. Periodic watering and chemical replenishment ensure an ongoing proper ground.

## 3.3 Unpacking

Inspect doorways, passageways, and elevators to verify that the shipping containers can be safely moved from the receiving dock to the computer room. Cut the straps, and remove the shipping cartons. Unpack and inventory the contents against the shipping order.

Keep the shipping containers and packing materials. To avoid questions of liability, if a container arrives damaged, do not open it except in the presence of the shipping agent or representative. Do not sign for a container that has severe damage.

After opening a container, inspect the drive for damage. If anything is damaged or missing, contact System Industries immediately. Return drives to System Industries in their SI shipping containers only. The original containers provide maximum protection during transport.

Allow the equipment to normalize to the computer room temperature before applying power.

## 3.4 Site Preparation

Use the checklist on the following page to confirm the site specifications and requirements discussed earlier in this section. The checklist pulls out for convenience.

# SITE PREPARATION CHECKLIST

| SITE NAME |
| PREPARER'S NAME |
| DATE |

CHECK (✔) EACH ITEM WHEN COMPLETED.

## GENERAL REQUIREMENTS

☐ Notified facilities.

☐ Notified system manager.

☐ Provided access to equipment.

☐ Provided access to telephone.

## SITE PREPARATION

☐ No obstacles to impede equipment delivery.

☐ Sufficient space for equipment and working area.

☐ Environmental requirements.

☐ Fire and safety precautions.

☐ Voltage and frequency requirements.

☐ Power routing and cable lengths.

☐ Static control.

**Notes:** _____

_____

_____
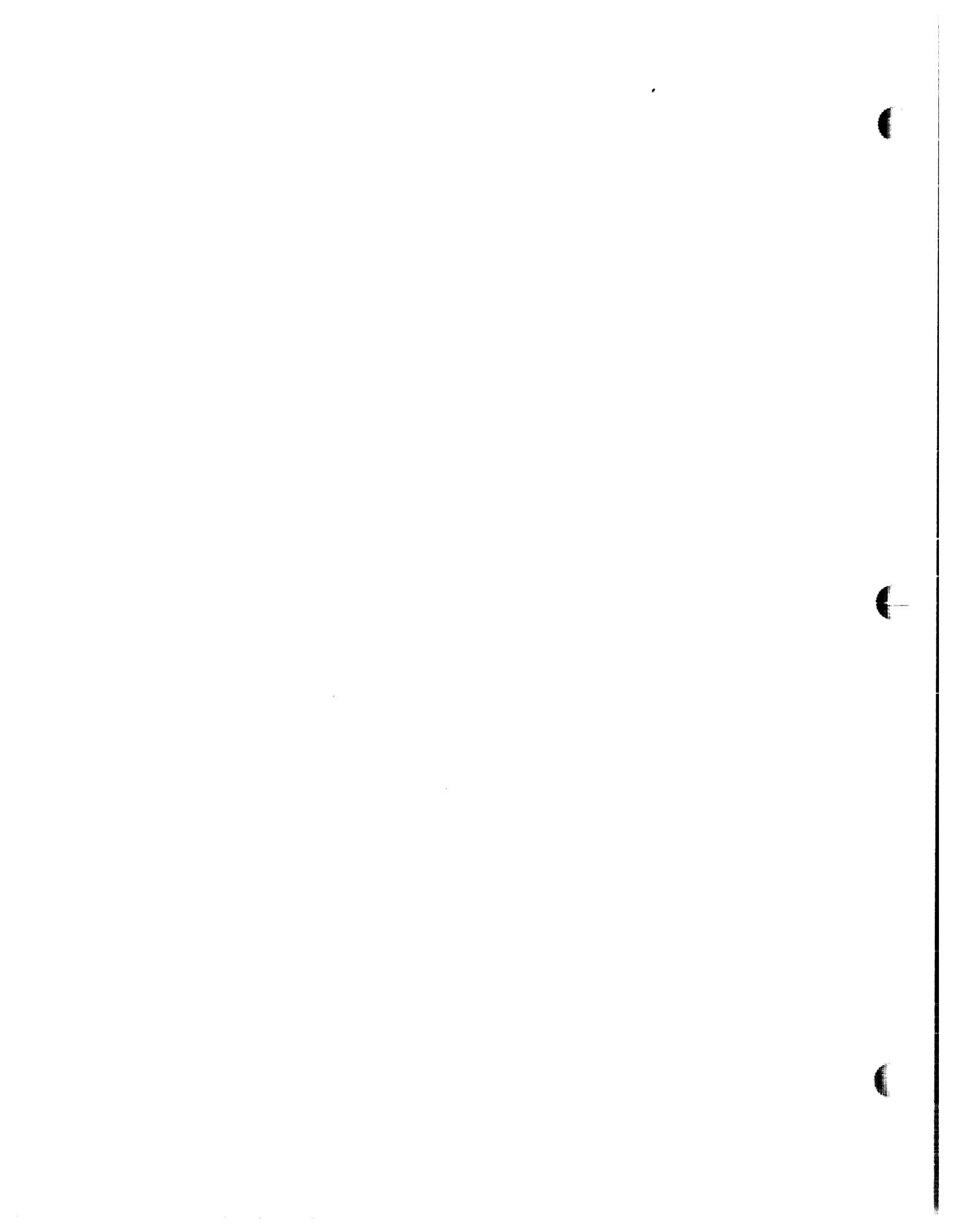
# 4
# INSTALLATION

This section provides procedures for the installation of the SI2480 Subsystem components in a standard SI cabinet, adding additional drives to the drive chassis, and installing a stacker/loader.

For powering-up the subsystem after installation, refer to "Operation." For removing and/or replacing system components during service, refer to "Maintenance and Troubleshooting."

## 4.1 General Precautions

Follow the precautions listed below to prevent injury to yourself or the equipment:

- Power down the system before performing any work on it.

### WARNING

Never remove or install any printed circuit board
or disconnect any connector, plug, or wire while
power is on it; doing so could cause failures.

- When removing connectors, do not pull on the cable; hold the connector firmly by its sides and pull out.

- Do not remove any parts not specified in the replacement procedure.

- When working near printed circuit boards, ground yourself with an anti-static strap.

- Read through the entire procedure before starting.

## Stabilizing Cabinet

Before starting any installation procedure that requires extending a chassis from a SI cabinet, stabilize the cabinet using the stabilizer bar. Refer to the cabinet manual for instructions.

## Inspection

Before starting installation or operation, do the following steps:

- Inspect the equipment, verifying that it is complete and undamaged.
- Verify that all cabinet internal cabling is seated.

## 4.2  SI2480 Cartridge Tape Subsystem Installation

This installation procedure explains how to install and cable the SI2480 Subsystem components into the cabinet. To power-up the system once the drive has been installed and connected to the controller, refer to "Operation." The components installed include the following:

- SI2480 FCU
- SI2480 Drive Chassis
- SI2480 Stacker/Loader

## SI2480 FCU Installation

This installation procedure explains how to install an SI2480 FCU into a cabinet, set switch and jumper settings, and connect the cables. The sequence for installing the controller is as follows:

- Setting switch and jumper settings
- Rack-mounting the controller

## Set switch and jumper settings

Before installing the controller in the cabinet, remove the SI board from the SI/DI slot with removal tools. Set switches SW1 and SW2 according to Table 4-1. Remove jumper JMP1. Switch and jumper locations are shown in Figure 4-1.

Table 4-1.  SI2480 Switch and Jumper Settings *

| SW 1 - 0 | SCSI ID LSB | SCSI ID must be set to 0, (all up) when installed on the Storage Director. Set SCSI ID to the appropriate #, (0-3), when installing on a US1000 or QS1000. |
|---|---|---|
| SW 1 - 1 | SCSI ID | |
| SW 1 - 2 | SCSI ID MSB | |
| SW 1 - 3 | | |
| SW 1 - 4 | Band Rate | |
| SW 1 - 5 | | |
| SW 1 - 6 | | |
| SW 1 - 7 | Parity | |
| SW 2 - 0 thru 7 | | Set all switches on SW2 UP or ON. |

\* A switch in the UP position is CLOSED or ON.
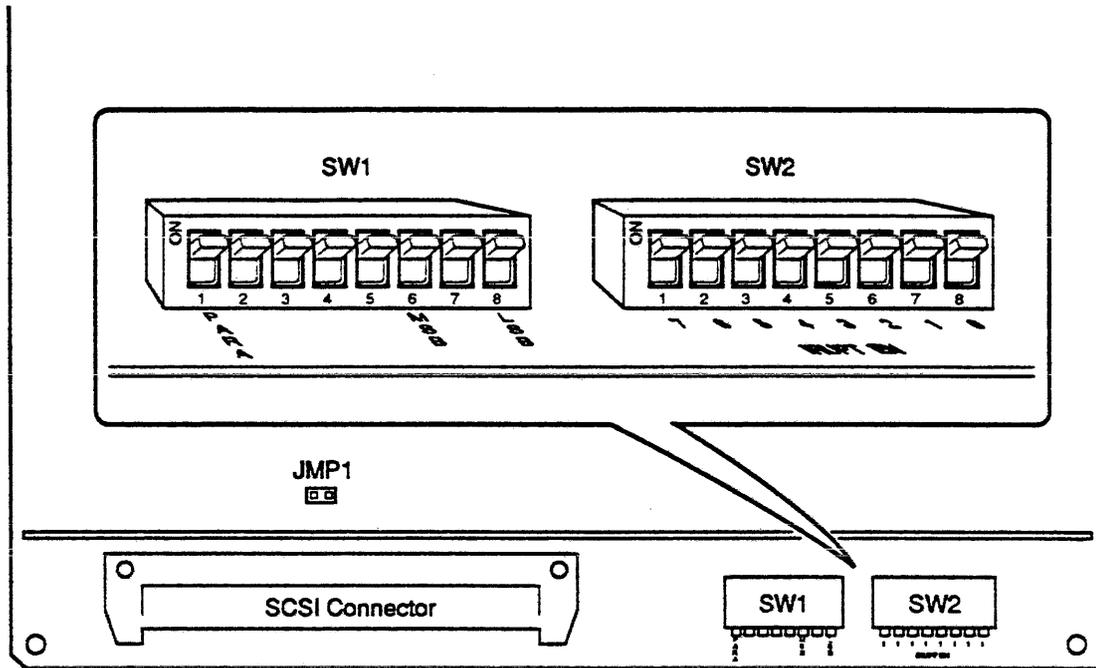
Figure 4-1. Controller Switch and Jumper Locations

## Rack mount the controller

Follow the instructions below to mount the controller to the cabinet. A detailed illustration is given in Figure 4-2.

**Step 1. Remove screws.**

- Remove the two retaining screws at rear of sleeve connecting FCU chassis to sleeve. Save the screws for replacing chassis.

**Step 2. Pull controller out of sleeve.**

- Release safety catch on back, inside of chassis. Place controller chassis on a flat, stable surface.

**Step 3. Attach controller sleeve to back of cabinet.**

- Attach each side of the controller sleeve to back of cabinet with four 10x32 screws.

**Step 4. Attach front of sleeve to cabinet.**

- Attach dual-lock metal plate on each side of cabinet with four 6x32 screws.
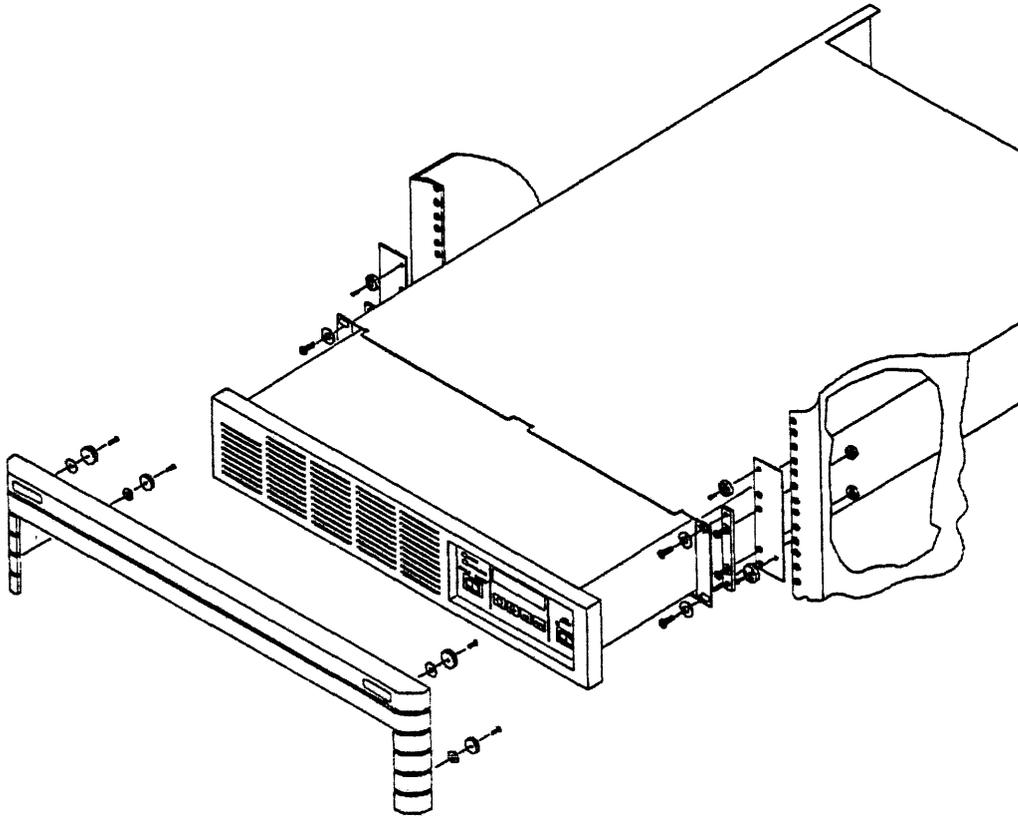
Figure 4-2.  Cabinet Installation for SI2480 Controller

- Attach metal spacer onto dual-lock plate with four 10x32 screws.
- Attach sleeve to each metal spacer with two 10x32 screws and two #10 flat washers.

**Step 5.  Lift the FCU and fit into mounted sleeve.**

- Slide the FCU back until it locks into place.
- Replace two retaining screws previously removed.

**Step 6. Mount the front panel to the cabinet.**

- Attach the front panel with four 6x32 screws, four dual-lock fasteners, and four #6 washers.

## SI2480 Drive Installation

This installation procedure explains how to install an SI2480 Drive Chassis into a cabinet and adding an additional drive to the chassis. For cabling information between the drive and power supply, refer to the vendor manual.

## Rack mount the drive chassis

The following procedure explains how to install and secure the slide rail in the cabinet, mount the chassis, and then secure the chassis front panel. Refer to Figures 4-3 and 4-4 when doing the procedure.
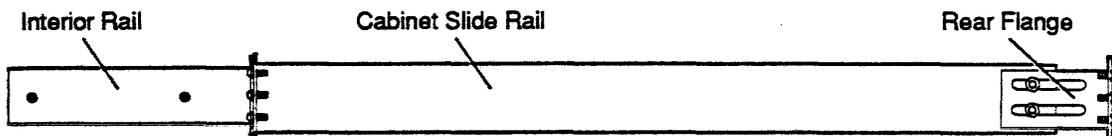


Figure 4-3.  Fixed Chassis Mounting Hardware

**Step 1.** Secure the front of each cabinet slide rail on the chassis to the cabinet's front vertical rails with the nut bar and two 10x32 screws provided.

- Make sure the nut bar is positioned to attach the fasteners on the ears.

**Step 2.** A flange is already attached to the rear of each slide rail on the chassis. Facing the rear of the cabinet, secure the extruded portion of the flange to the cabinet's interior vertical rail with two 10x32 screws.

**Step 3.** Facing the front of the cabinet, slide the interior rails into the cabinet slide rails just mounted.

- Stop when they lock into position (the rails will extend out of the cabinet about half-way).

**Step 4.** Lift the chassis and fit the extruded interior rails into the slide mounts bolted to the exterior of the chassis, and slide the chassis back in until it locks.

- The releases on each side of the bolted chassis slide mounts fit into holes in the extruded interior rails.

**Step 5.** Mount the front panel to the cabinet.

- Attach the front panel with two stabilizer brackets, four 6x32 screws, and four dual-lock fasteners.

## Add a second drive to a chassis

When an SI2480 Drive is not installed at the factory, a metal plate is attached to the chassis where the drive should be placed. For cabling between the drive and power supply, refer to the vendor manual. Drive installation is shown in Figure 4-4.

**Step 1. Remove screws securing metal front plate to chassis.**

**Step 2. Attach drive to chassis with screws.**

   • Attach power supply to chassis with screws.

**Step 3. Attach cables from drive to power supply.**

   • Attach cables from power supply to chassis.

**Step 4. Replace chassis into sleeve.**

   • Slide the chassis back until it locks in place.

**Step 5. Attach two retaining screws to back of cabinet.**

**Step 6. Attach cables from drive chassis to controller. Power-up subsystem.**
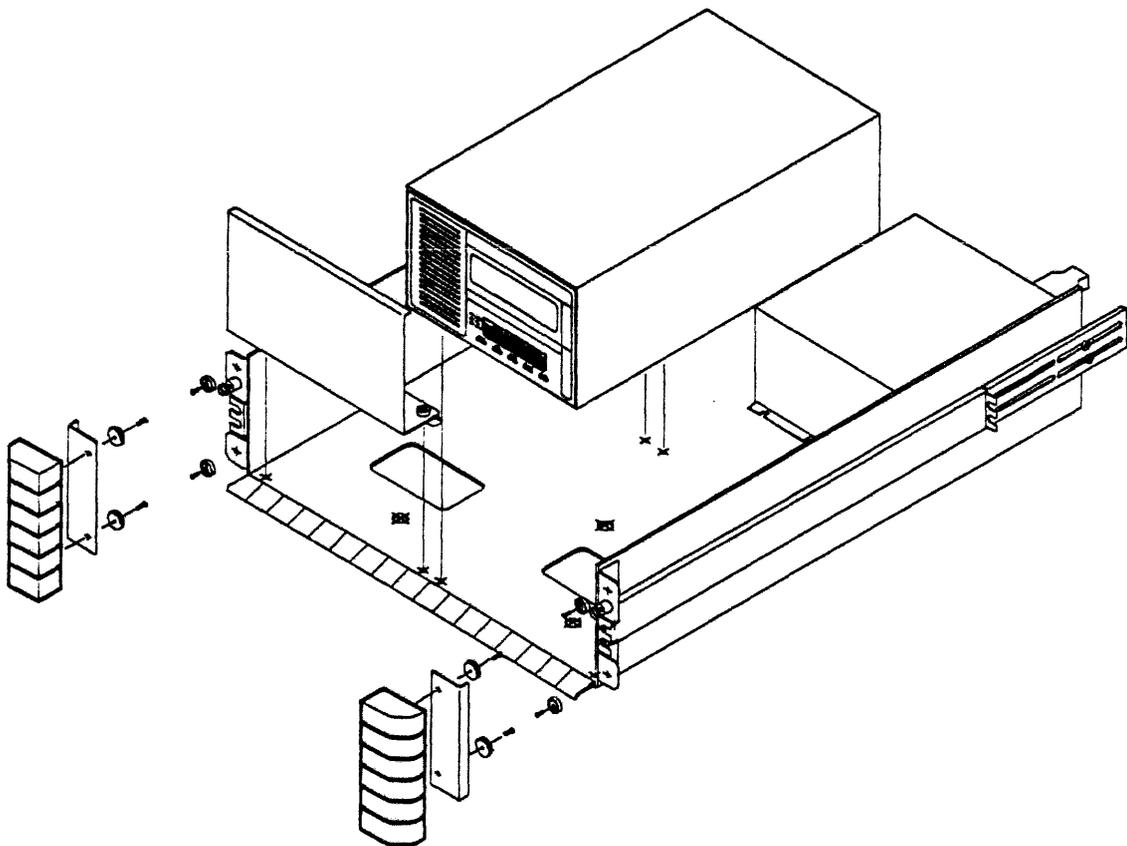


Figure 4-4.  SI2480 Drive Chassis Installation

## 4.3 SI2480 Subsystem Cable Installation

The SI2480 Subsystem requires six cables to connect to the system. Each cable is described in the following text. The back panel of the controller is shown in Figure 4-5. The back panel of the drive chassis is shown in Figure 4-6. Cable connectors for the chassis power supply are shown in Figure 4-7.

### NOTE

Allow a gap of 50mm or more between fans and rear of drive. Interference of air flow can cause the chassis to overheat.

### SCSI CABLE:

The first cable is a 50-pin SCSI cable attaching the FCU to the TSI board in the Storage Director. When configured on a DEC HSC, the 50-pin cable connects to either the transition panel or another tape device when configured with a US1000 or QS1000. The cable attaches to a female connector (SCSI IN) on the back of the controller. A label indicating the correct connector is on the back of the controller.

### NOTE

When a FCU is not daisychained to a second FCU or SCSI device, a terminator must be attached to the SCSI OUT connector.

When a second FCU or SCSI device is added, the terminator must connect to the SCSI OUT connector on the last controller.

### POWER CABLE:

The power cable is a three-prong male connector that attaches the controller to the main power distribution unit on the cabinet floor. Power supplied is factory set for 115 VAC or 230 VAC. To convert the preset power, refer to the section "Maintenance and Troubleshooting."
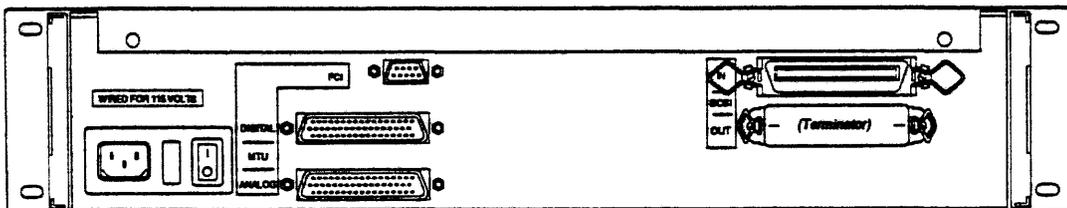


Figure 4-5.  SI2480 Controller Back Panel

**CONTROL CABLE:**

The digital control cable is a 50-pin cable that attaches with a female connector on one end to the controller. The other end of the cable attaches to the top, left side of the first tape drive (P1A). The cable length is 6 feet (2 meters). Installation information on the cable clamp kit is found in the vendor drive manual.

**NOTE**

A terminator must be attached to the bottom control connector (P1B) to the drive, or to the last drive of a daisychain.

**DATA CABLE:**

The analog data cable is a 40-conductor cable that attaches to the controller with a 50-position, 40-pin male connector. The other end of the cable attaches to the top, right side of the first tape drive (P2A) with a 40-pin female connector. The cable length is 6 feet (2 meters). Refer to the vendor manual for cable clamp information.
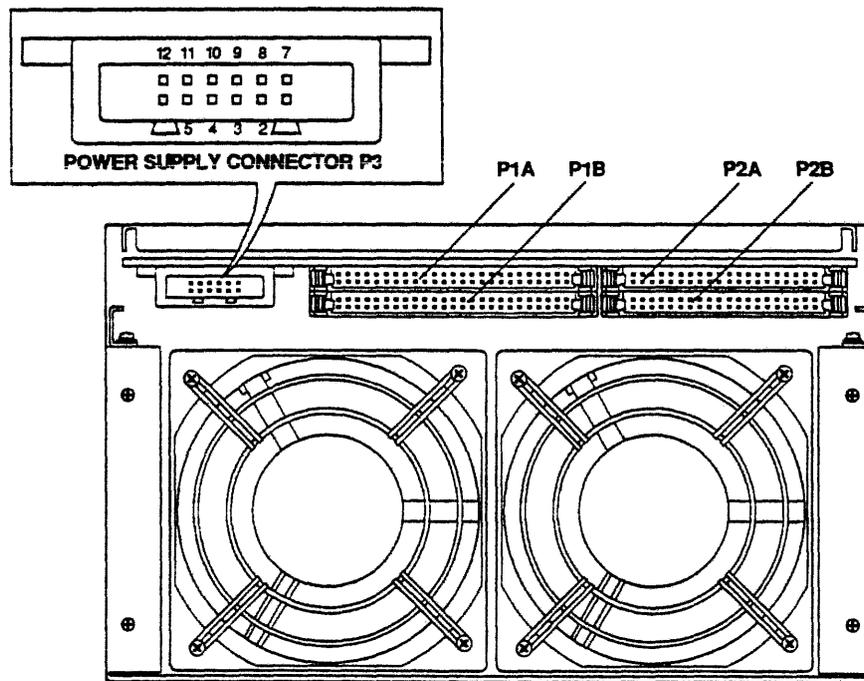


Figure 4-6. SI2480 Drive Back Panel

### DRIVE POWER SUPPLY CABLE:

For cabling the drive power supply, two cables are used. The first cable is a 9-pin, power control cable that attaches to a controller connector (PCI) with a female connector.  The other end of the cable attaches to the power supply connector (PCI) located on the back panel of the first drive.  The cable length is 6 feet (2 meters).  The back panel connectors are shown in Figure 5-4, in the next section.

The second drive power supply cable is a 12-pin, DC power cable with female connectors that connects to the back of the drive (P3) and to the front of the power supply (CNP91).  Installation information on the cable clamp kit is found in the vendor drive manual.  The front panel of the power supply is shown in Figure 4-7.
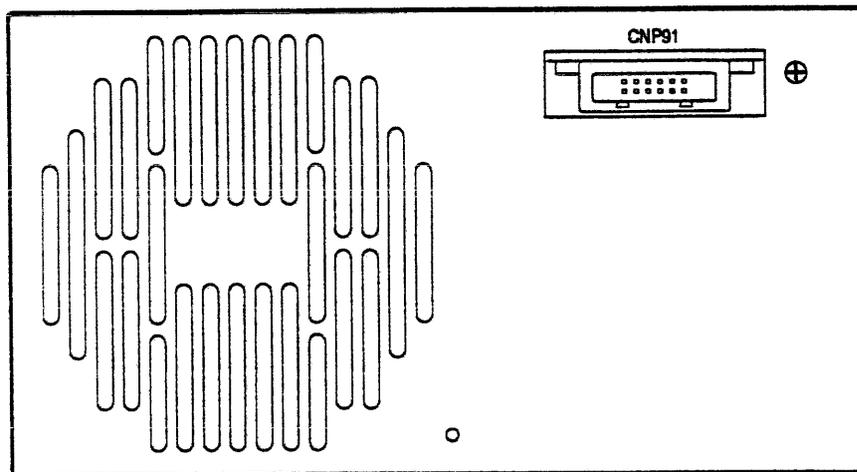


Figure 4-7.  SI2480 Drive Power Supply Front Panel

### *Power Supply Operation*

There are two DC power switches: ON/OFF power and remote or local power.

**NOTE**

Refer to the "Operation" section for power-up
procedures for both the controller chassis and the
drive chassis.

- Remote or Local Mode:  Power ON/OFF is controlled by the host system.
  - · Required setting is REMOTE.
- Power Mode:  Power is switched ON/OFF by the power switch of this power supply.
  - · Required setting is ON.

**CABLING FROM DRIVE TO DRIVE:**

To connect additional drives, a different cable kit is required. This cable kit contains three cables: a control cable, a data cable, and a power control cable.

- Attach control cable from P1B connector on first drive to P1A connector on second drive. Move the terminator on P1B of the first drive to P1B on the last drive of the daisychain (second drive).

- Attach data cable from P2B connector on first drive to P2A connector on second drive.

- Attach 9-pin power control cable from PCO connector on rear panel of first power supply to PCI connector on rear panel of second power supply.

**NOTE**

A terminator must be attached to the bottom control connector (P1B) on the last drive of a daisychain.

## 4.4 SI2480 Stacker/Loader Installation

Before installing the stacker/loader, make sure to power down the subsystem using the procedures in "Maintenance and Troubleshooting." Installation procedures are shown in Figures 4-8 and 4-9.

**REMOVE DRIVE FRONT PANEL:**

1. Extend the chassis from the cabinet.

2. Remove four screws holding drive to chassis front. SAVE for replacement procedures.

3. Slide drive out to expose drive front panel sides. Remove the four screws attaching the operator panel to the drive. SAVE for replacement procedures.

4. Unplug the 10-pin female connector from the back of the drive front panel. SAVE for replacement procedures.

5. Remove the top flathead screw attaching the rod to the front panel frame.

6. Remove the hex grounding screw and star washer from the drive. SAVE for replacement procedures.

7. Remove the BIG roundhead screw attaching the operator panel frame to the base of the drive.

8. Remove rod from frame by unscrewing shaft.

9. Replace grounding wires, hex screw, and star washer to drive.
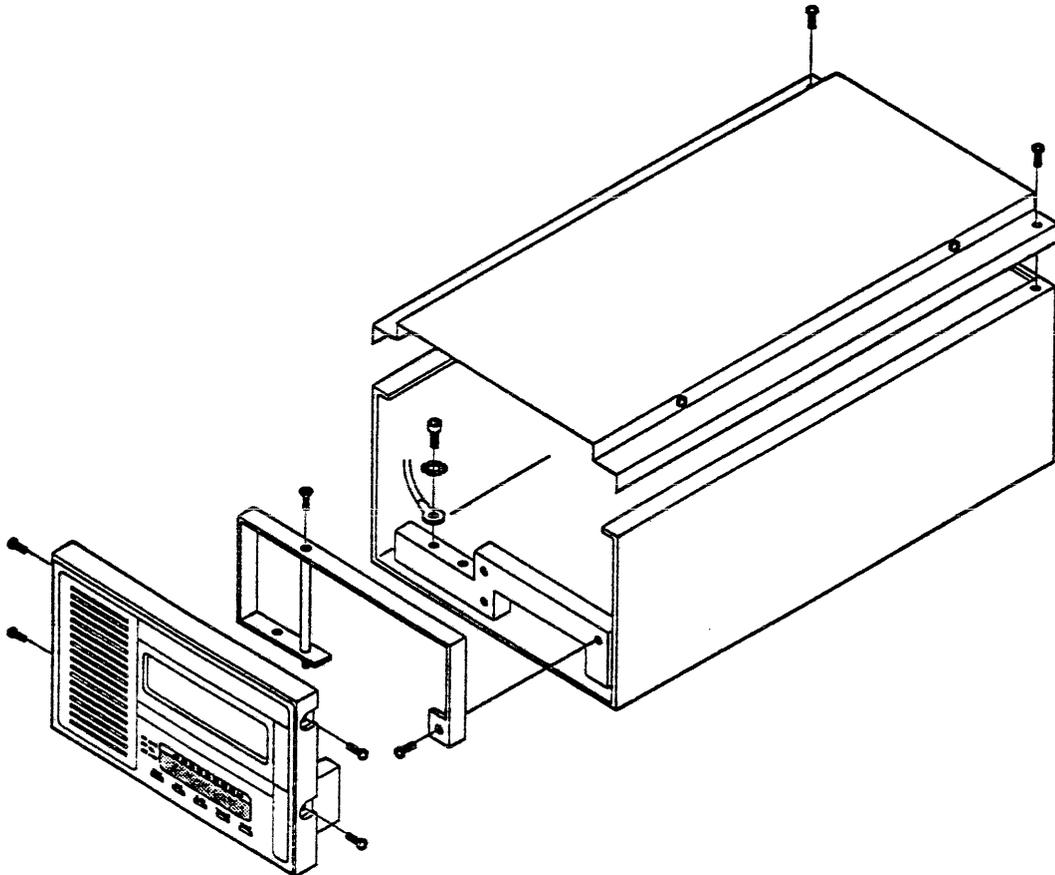
Figure 4-8.  SI2480 Stacker/Loader Installation (front panel)

10. Lift drive to expose side of top cover frame.  **Loosen** four screws holding drive cover to chassis.  Do Not Remove Screws.

11. Remove two roundhead screws from rear of cover attaching drive cover.  Lift back of cover until front unhooks from drive.

**REMOVE TOP COVER OF LOADER**

1.  Remove two screws attaching top cover to loader.  Remove cover.

2.  Remove three flathead screws from top of baseplate.

3.  Remove four flathead screws from bottom of baseplate.

4.  Remove loader from baseplate.

**MOUNT LOADER BASEPLATE TO DRIVE**

1. Attach front panel extension cable to drive and then insert through slot on loader baseplate.

2. Attach loader baseplate to drive front with three allen bolts.

**REATTACH LOADER TO BASEPLATE**

1. Slide loader about half-way back into baseplate.

2. Attach cable to back of front operator panel on loader.

**NOTE**

Make sure cable is free from allen bolt on baseplate.

3. Attach 34-pin ribbon cable to connector on top front of tape drive board. Attach other end of cable to 34-pin connector on side of PCA board of loader.

4. Slide autoloader fully into baseplate.

5. Replace three screws to top of baseplate to attach loader.

6. Replace four screws to bottom of baseplate to attach loader.

**CHECK EPROM**

1. Check that EPROM 81040 is a Rev H or higher.

**REATTACH REMAINING COVERS, CABLE, AND POWER-UP**

1. Adjust front cover of loader over operator panel.

2. Replace two screws to bottom of loader to attach top cover.

3. Attach top cover of drive with two screws. Lift drive up slightly and tighten the four side screws previously loosened.

4. Replace four flathead screws attaching drive mounting plate and drive to chassis.

5. Power-up chassis.
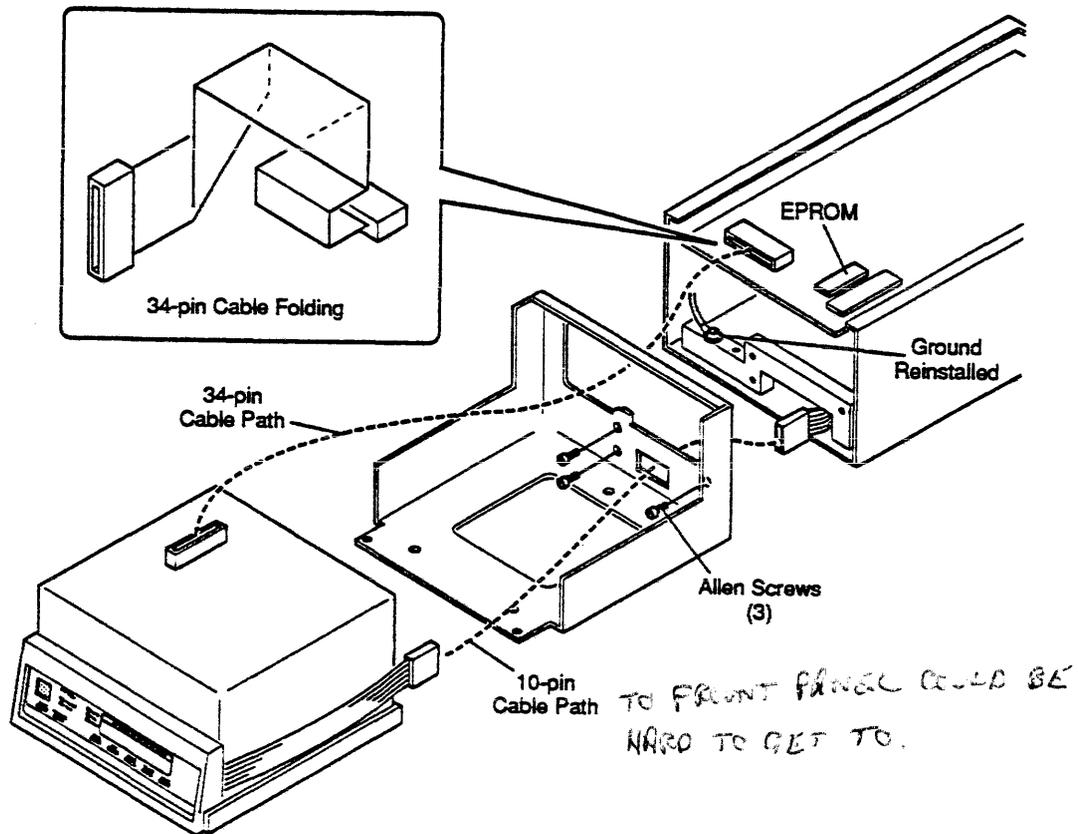
**Figure 4-9. SI2480 Stacker/Loader Installation**

**USING STACKER MAGAZINE**

1. Insert stacker magazine to top of loader.

**NOTE**

Cartridge numbers start at 1 from the top (near handle). Number 10 is shown as 0 on operator panel.

2. Push START on operator panel.
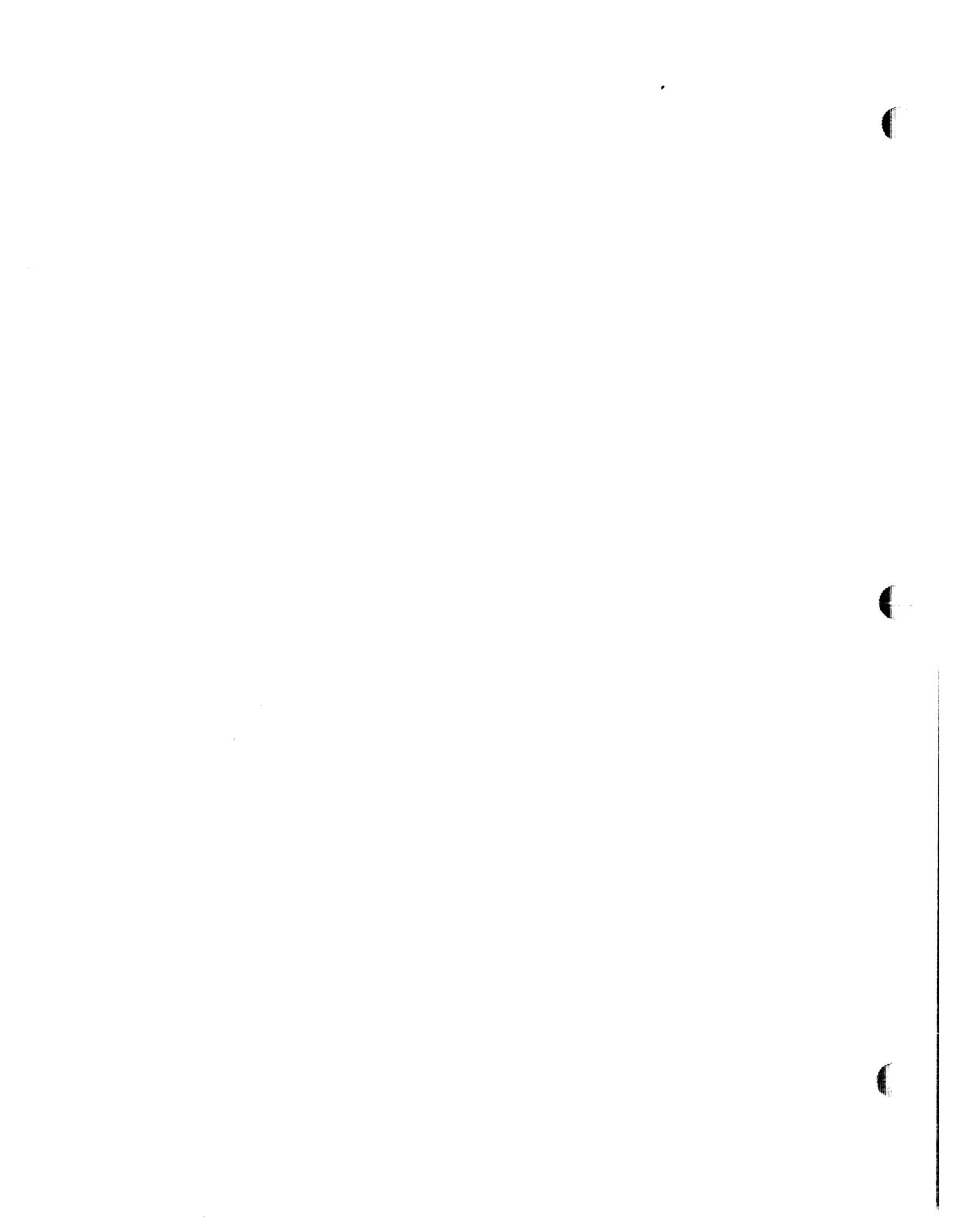
# 5
# OPERATION

This section describes the operation of the SI2480 Cartridge Tape Subsystem. The discussion covers the basics of the controller, tape drive, power supply, and stacker/loader. The functions of these components rely on their respective operator's panels. For detailed instruction on setting switches and changing default options, refer to the vendor manual.

## 5.1 SI2480 Controller (FCU)

The front portion of the controller contains a combination operator panel and maintenance panel. As operational controls, the panel contains a unit power ON/OFF switch for the controller, an ENABLE/DISABLE switch for the SCSI interface, status indicators, diagnostic switches, and a diagnostic display panel. A detailed illustration of the SI2480 Controller front panel is shown in Figure 5-1.

### Unit Power On/Off Switch

This switch makes or breaks power to the controller and initiates drive power sequencing or drive power off. The last drive in the string sends a power complete signal to the controller to indicate successful power up.
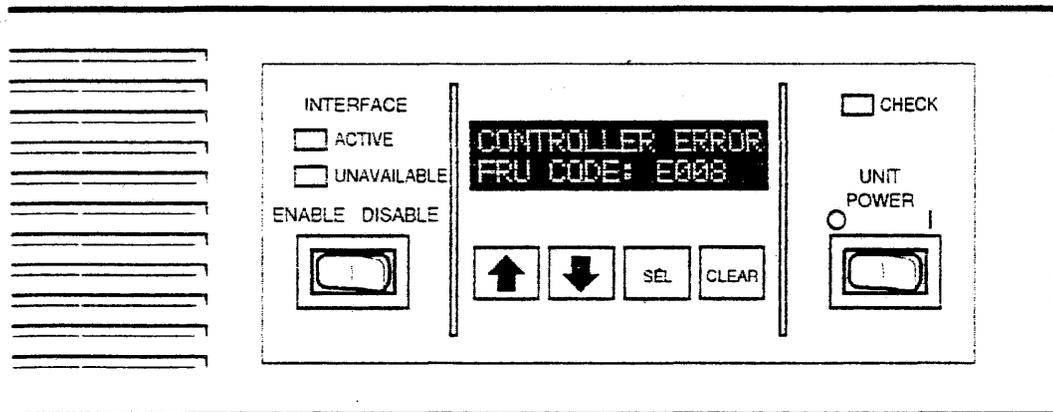
Figure 5-1. SI2480 Controller Front Panel

### Interface Enable/Disable Switch

This switch provides a logic level signal to the SCSI interface controller requesting that the SCSI controller interface drivers/receivers be enabled for on-line operation or disabled for off-line operation. Placing this switch in the DISABLE position disables the interface drivers/receivers after all operations in progress are completed.

### Interface Active Indicator

A green LED that is ON when the interface drivers/receivers are enabled and the controller's buffer contains data for any initiator or is actively processing a command.

### Interface Unavailable Indicator

A yellow LED that comes ON whenever the controller is off-line to the SCSI interface. The diagnostic panel buttons are enabled when in this state.

### Check Indicator

A red LED that is ON whenever the controller detects a controller malfunction.

### Diagnostic Switches and Display

For maintenance, the front panel provides a window for displaying diagnostic information, and a keypad for diagnostic commands. Refer to the vendor manual for more detailed information.

## 5.2 SI2480 Tape Drive

The SI2480 Cartridge Tape unit is connected to an SI2480 Tape Controller. The front panel of the SI2480 Tape Drive contains the following:

- LEDs
    - ATTN. — for attention
    - SEL. — for selection
    - COMP. — for compression
    - BOT and EOT — seven LEDs indicating remaining tape length
    - message display panel
- Switches
    - COMP. — for compression
    - TEST — for test
    - START — for start
    - UNLOAD — for unload
    - RESET — for reset
- Cartridge entry slot.

Figure 5-2 shows these details of the SI2480 Cartridge Tape Drive front panel.
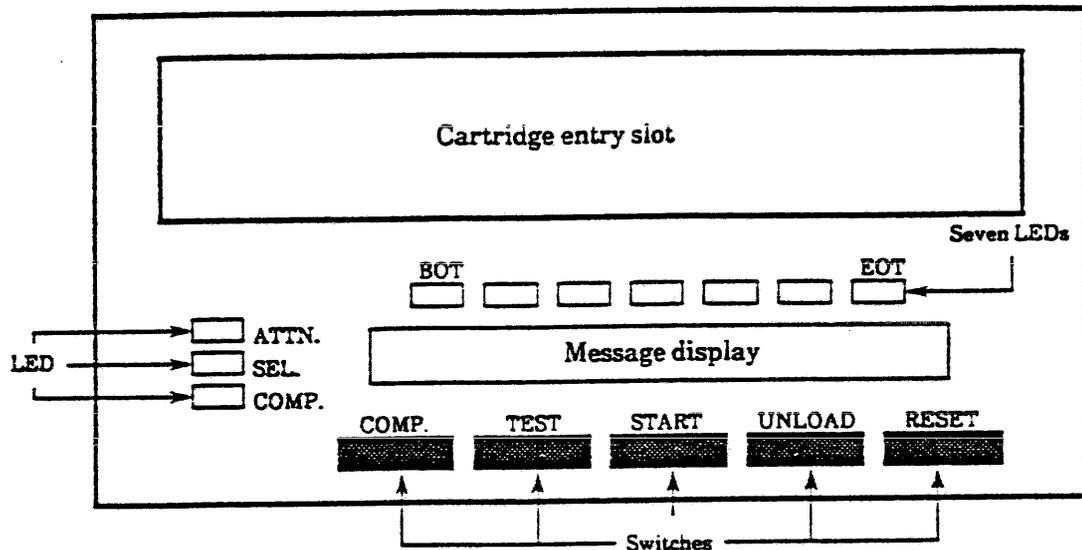
Figure 5-2.  SI2480 Cartridge Tape Drive Front Panel

## Operator Panel Switches

The operator panel has five switches. Confirmation messages are displayed when switches are pressed for modes other than the test mode.

### COMP. Switch

Activating the COMP. switch depends on having the following hardware and the software configuration:

- Hardware — an XL board, an XLE board, or neither board is in the XL controller slot.

- Software — there are 20 software setting items numbered 70 to 89. Item 72 sets the data compression mode. A complete list of all the setting modes, details of item 72, and instructions for how to use them are given after Table 5-7.

The COMP. switch should be activated by the software only if there is an XL board in the XL controller slot and if the cartridge tape has no metal label sensor.

Find out from the field engineer or look at the equipment to see if the controller has an XL or XLE PCA board.

For information on how to select options in item 72, see the Test Commands subsection following Table 5-7 in this manual. For additional information refer to the Cartridge Tape Drives OEM Manual publication number 982-2524, Section 5.2.2 Setting methods. Depending on the board in the controller XL slot, select one of the three following options to set item 72:

- The XL slot has neither an XL nor an XLE board. Without either board, compression is not possible. Using the methods given in the Test Commands section, select "NO COMP" in item 72 to deactivate the COMP. switch and the corresponding compression message.

- The XL slot has an XL board. Using the methods given in the Test Commands section, select "M&K COMP" in item 72. The data compression mode is set by the metal label sensor or the COMP. switch.

- The XL slot has an XLE board. Using the methods given in the Test Commands section select "NO COMP" in item 72. This deactivates Fujitsu compression, the COMP. switch, and the corresponding compression message.

If the COMP. switch is activated, press it before loading or when unloading the cartridge to select the data compression mode. If the data compression mode was selected previously, it is cancelled. When activated, the COMP. (compression) LED lights when the data compression mode is set. It goes out when the data compression mode is cancelled.

## NOTE

Data is written from BOT in the specified mode.

### TEST Switch

The TEST switch pressed simultaneously with the UNLOAD switch begins the test mode. The TEST switch also activates various functions within the test mode.

## NOTE

To initiate or use the test mode follow the procedure in the
Test Commands subsection following Table 5-7.

### START Switch

This switch operates only when a cartridge is inserted and the drive is in the not-ready state.

If the tape is at BOT when this switch is pressed, the drive is set to the ready state. If the tape is not at BOT, the drive rewinds the tape and enters the ready state.

### UNLOAD Switch

If the drive is not ready or in the error state, the UNLOAD switch is pressed to unload and automatically eject the cartridge. The error state is released. If the drive is ready, the RESET switch must be pressed and released before pressing the UNLOAD switch.

### RESET Switch

The RESET switch puts the equipment in the NOT READY state. In this state, the TEST, START, UNLOAD, and EJECT switches are made available.

When an error occurs, this switch is used to reset the error.

## Operator Panel Indicators

The operator panel has three LEDs, a remaining tape length LED, and a message display.

### ATTN — Attention LED

Upon reception of a MOUNT or DISMOUNT/MOUNT message from the host system, the ATTN LED blinks to prompt the user to mount the cartridge; otherwise this LED is off.

### SEL. — Selected LED

When the controller selects the tape drive, the SEL LED lights.

### COMP. — Compression LED

The COMP. LED shines when the data compression mode is selected (and it is activated — see COMP. Switch subsection). It stays lit during data compression.

### BOT and EOT — Remaining Tape Length LEDs

The tape from BOT to EOT is divided into seven sections, and seven LEDs are assigned, one LED to each section, to indicate the remaining tape length. When the tape stops, the first LED through the LED indicating the current tape position shine as shown in Figure 5-3. When the tape is running, the LED indicating the current tape position blinks, and the LEDs to the left of the blinking LED shine as shown in Figure 5-4.

BOT                                                           EOT

On       On       On       On       Off       Off       Off

Figure 5-3.  Remaining Tape Length Display When the Tape Stops

BOT                                                           EOT

On       On       On       On       Blinks       Off       Off
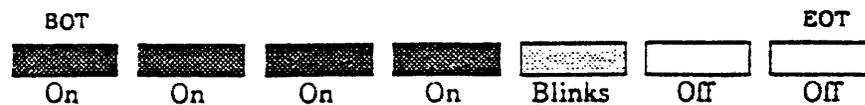
Figure 5-4.  Remaining Tape Length Display When the Tape is Running

***Message Display***

This displays the background, check, fixed, host, or not-ready messages with eight alphanumeric characters (including symbols).

The meanings of the messages are given below in alphabetical order. The descending order of priority of the messages in this section is: check, not-ready, fixed, host, and background. If several messages are being processed simultaneously, the message with the highest priority will be displayed first.

### *Background Message*

The background messages, shown in Table 5-1, indicate the current drive state. It is given the lowest priority.

Table 5-1 Background Messages

| DISPLAY | MEANING |
|---------|---------|
| * | No cartridge is loaded |
| * CLEAN | Same as above. Cleaning is required. |
| READY U | The tape is loaded and writing is enabled. |
| READY F | The tape is loaded but writing is inhibited. |

### *Check Message*

The type of check messages for the drive and controller are shown in Table 5-2. Table 5-2 also shows corresponding reference sections and manuals for a complete list of the codes. The check messages, shown in Table 5-3, are displayed when the drive detects an error and operator intervention is required. The examples shown in Table 5-2 are displayed on the tape drive message LED in place of XX shown in Table 5-3.

Table 5-2 Type of Check Messages for the Drive and Controller

| HARDWARE | TYPE | SECTION | MANUAL | EXAMPLES |
|----------|------|---------|--------|----------|
| Drive | Check | 9 Table 9.1 | M248A/B Cartridge Tape Drives CE Manual publication number 44FH6811E | C01, C82, D01 |
| Drive | FSC | 9 Table 9.2 | M248A/B Cartridge Tape Drives CE Manual publication number 44FH6811E | E11F, 5046 |
| Controller | FRU | 2, 5* | M1016 Cartridge Tape Controller CE Manual publication number 31FH6809E | E523 |

* Section 2 designates FRU codes in the form Exyz (example E523), where E is the error code, the first number, x (5) is the primary FRU which is the first guess of the hardware causing the error, y the secondary guess, and z the tertiary. Section 5 shows a figure titled "Block diagram of tape controller by FRU Assignments" for the hardware location of x (5), y (2), and z (3).

Table 5-3 Check Messages

| CODE | MEANING |
|------|---------|
| ▓CHK XX▓ | When a hardware error occurs, a hexadecimal error code is displayed. |
| XXXXXXXX | When the operator makes a mistake, a message (in words, not a code) is displayed. |

### Fixed Message

The fixed messages, shown in Table 5-4, indicate drive operation states. They have priority over a host message.

Table 5-4 Fixed Messages

| CODE | MEANING |
|------|---------|
| UNLOADING | The tape is being unloaded. |
| REWINDING | The tape is being rewound. |
| LOCATING | Data is being searched. |
| ERASING | Data security is being performed. |
| E.O.T. | The tape is in the EOT area. |
| COMPRESS | Data is being read/written in the data compression mode. |
| CLEANING | The drive is being cleaned. |

### Host Message

A message sent from the host system by a load display command is displayed in the mode specified by the control byte of the command. It is shown as XXXXXX in Table 5-5.

Table 5-5 Host Messages

| VALUE | MEANING |
|-------|---------|
| XXXXXXXX | The 8-character or 16-character message sent from the host system is displayed. |

*Not-ready Message*

The not-ready messages, shown in Table 5-6, are displayed when a cartridge is loaded and the drive is in an off-line state.

Table 5-6 Not-Ready Messages

| CODE | MEANING |
|------|---------|
| NT RDYU | The drive is not ready but writing is enabled. |
| NT RDYF | The drive is not ready and writing is inhibited. |

## Operator Panel Functions

Figure 5-2 shows the location of the switches on the front panel which are discussed in this section.

### Loading

When no cartridge is presently in the drive, a cartridge inserted in the cartridge entry slot is loaded automatically.

### Rewinding

To rewind the tape, press the START switch. Normal operation rewinds tape to BOT automatically.

### Unloading

To unload the cartridge, press the RESET switch, then press the UNLOAD switch.

### Testing

To select a diagnostic/setting mode, press and hold both the TEST and UNLOAD switches for more than two seconds. This mode cannot be entered if a cartridge is loaded.

When the RESET switch is pressed, the current function is canceled.

In the TEST mode, the front panel switches operate in the manner shown in Table 5-7.

Table 5-7 Switches

| SWITCH | FUNCTION |
|--------|----------|
| START | Selects the next test function. |
| COMP. and START | Selects the preceding test function. |
| TEST | Executes the selected test function. |
| RESET | Cancels the current function and selects the preceding function. |

*[handwritten annotations in top margin: FUNCTNL TEST / DATA BUFFER / SCSI INTERFACE TEST / PUSH TEST & FUNCTND AT SAME TIME / YU GET (DIAG) THEN PUSH START = (SETTING) / START = (SEL MTC) THEN PUSH TEST = (CTRL OFL) / (PUSH STR) & PUSH START = (CC:CNFG) THEN START (O::OFLN) / PUSH TEST / (O:RUN:OFC) / START oR / SEL TEST #]*

*Software Setting items*

The following items can be set or changed using the Test mode procedure in the Test
Commands section below.

The following setting items are displayed on the message LED in the order shown below.
The location of the message LED on the front panel is shown in Figures 5-2 and 5-5 for
the tape drive and for the stacker/loader:

1. "70:S.L-A:" . . . . . . . . Sets the logical address
2. "71:S.L-A:" . . . . . . . . Sets an EC level
3. "72:S.L-A:" . . . . . . . . Sets the data compression mode
4. "73:S.L-A:" . . . . . . . . Sets the display message language
5. "74:S.L-A:" . . . . . . . . Sets the message to be displayed at BOT
6. "75:S.L-A:" . . . . . . . . Sets display of the logical address
7. "76:S.L-A:" . . . . . . . . Sets the operator panel intensity
8. "77:S.L-A:" . . . . . . . . Sets a pump use mode
9. "78:S.L-A:" . . . . . . . . Selects an additional function
10. "79:S.L-A:" . . . . . . . . Selects an additional function
11. "80:S.L-A:" . . . . . . . . Selects an additional function
12. "81:S.L-A:" . . . . . . . . Selects an additional function
13. "82:S.L-A:" . . . . . . . . Reserved
14. "83:S.L-A:" . . . . . . . . Reserved
15. "84:S.L-A:" . . . . . . . . Reserved
16. "85:S.L-A:" . . . . . . . . Reserved
17. "86:S.L-A:" . . . . . . . . Reserved
18. "87:S.L-A:" . . . . . . . . Reserved
19. "88:S.L-A:" . . . . . . . . Displays the selected data.
20. "89:S.L-A:" . . . . . . . . Writes the selection data to EEROM.

*Examples of options of the setting methods*

The following are examples of options available for setting items 70, 72, 73, and 89. For
a similar level of detail for the other setting items see the Cartridge Tape Drives OEM
Manual part number 982-2524, Section 5.2.2.

70:S.L-A

Set the logical address of the drive.

When the following message is displayed on the panel, press START and COMP.
switches to select a logical address. Then, press the TEST switch to set the
selected logical address.

"L-ADR:#" (# is a logical address represented by 0, 1, 2, or 3)

72:S.CMP

Set a data compression mode.

When the following message is displayed on the panel, press START and COMP. switches to select a data compression mode. Then, press the TEST switch to set the selected data compression mode.

"NO COMP": Data is not compressed.

"MTL COMP": The data compression mode is set by the metal label sensor.

"KEY COMP": The data compression mode is set by the operator panel switch. (COMP)

"M&K COMP": The data compression mode is set by the metal label sensor or the operator panel switch. (COMP)

73:S.LNG

Sets the language of the display messages.

When the following message is displayed on the panel, press START and COMP. switches to select a language. Then, press the TEST switch to set the selected language.

"ENGLISH"

"FRENCH"

"GERMAN"

"SPANISH"

"ITALIAN"

89.WTROM

Write the setting data to nonvolatile ROM (EEROM).

When the following message is displayed on the panel, press START and COMP. switches to select a write mode. Then, press the TEST switch to set the selected write mode.

"WTROM: Y": The set data is written to EEROM.

"WTROM: N": The set data is not written to EEROM.


*Test Commands*

To operate the test commands use the following procedure:

1. Press the RESET switch to set the drive in the not ready state, then press the UNLOAD switch to eject any loaded cartridge.

2. To enter the TEST mode, press and hold both the UNLOAD switch and the TEST switch. After a few seconds, the message LED will display the following:

DIAGMODE

which performs drive diagnostics.

3. Press the START switch to display the next option. The message LED will display the following:

SETTING

which changes various settings of the drive.

**NOTE**

The test commands can be toggled back and forth to either the DIAGMODE mode or to the SETTING mode using the START switch.

4. Choose either the DIAGMODE or the SETTING mode using the START switch or escape out of the test mode entirely using the RESET switch.

5. Press the TEST switch to enter either the DIAGMODE or the SETTING mode (whichever is displayed on the LED). The message LED will change to a code for either a specific DIAGMODE or SETTING mode item. For example, the code displayed on the LED as

    70:S.L-A

refers to the first SETTING mode item shown in the Cartridge Tape Drives OEM Manual as

    70:S.L-A: . . . . .Sets the logical address.

**NOTE**

See Cartridge Tape Drives OEM Manual part number 982-2524, Section 5.2 for a complete listing of all the SETTING items and the possible options in each item.

6. Press the START switch or both the COMP and START switches to scroll forward or backward through the DIAGMODE or SETTING items.

7. Press the TEST switch to display the current setting option for the setting item shown on the LED. For example, for the setting item displayed as

    73:S.LNG,

the current language setting option in the LED may be shown as

    FRENCH.

## NOTE

Use steps 8 through 10 to return to the main menu; use step 11 to continue selecting an option within the item. Steps 8 through 10 can be used at any time to return to a previous level.

8. To return to the DIAGMODE or SETTING items (whichever mode is set), press the RESET switch.

9. To regress further to display the words DIAGMODE or SETTING on the LED, press the RESET switch again.

10. To return to the main menu, press the RESET switch again.

11. To scroll through the options within the setting or diagmode items, press the START switch. This will display the next item without permanently changing it.

12. To select a new option (which is shown on the LED) press the RESET switch to return to the setting or diagmode item and continue to the next step; to keep the options as they were, press the RESET switch and go to step 6 to scroll through the other items.

13. To permanently change the option selected in step 12, scroll to setting item 89 shown on the LED as

    89:WTROM

and displayed in the manual as

    89:WTROM: . . . . . . . . Writes the selection data to EEROM

Then press the TEST switch to display on the LED the option Y (if the option is N press the START switch to change the option to Y), press the TEST switch again to activate and change the option selected.

14. Press the RESET switch.

15. To select another item go to step 6; to return to the main menu press the RESET switch again.

## 5.3 SI2480 Stacker/Loader

The SI2480 Stacker/Loader is connected to an SI2480 Tape Drive. The front panel of the stacker/loader is the same as the SI2480 Tape Drive plus the following additions: magazine start, system, and auto indicators; mode select and eject operational switches; and a single digit numeric LED indicating cartridge number.

A detailed illustration is shown in Figure 5-5. The dotted box shows the SI2480 Tape Drive operator panel controls and indicators without the stacker/loader options. The operation of each switch and indicator LED is discussed below.
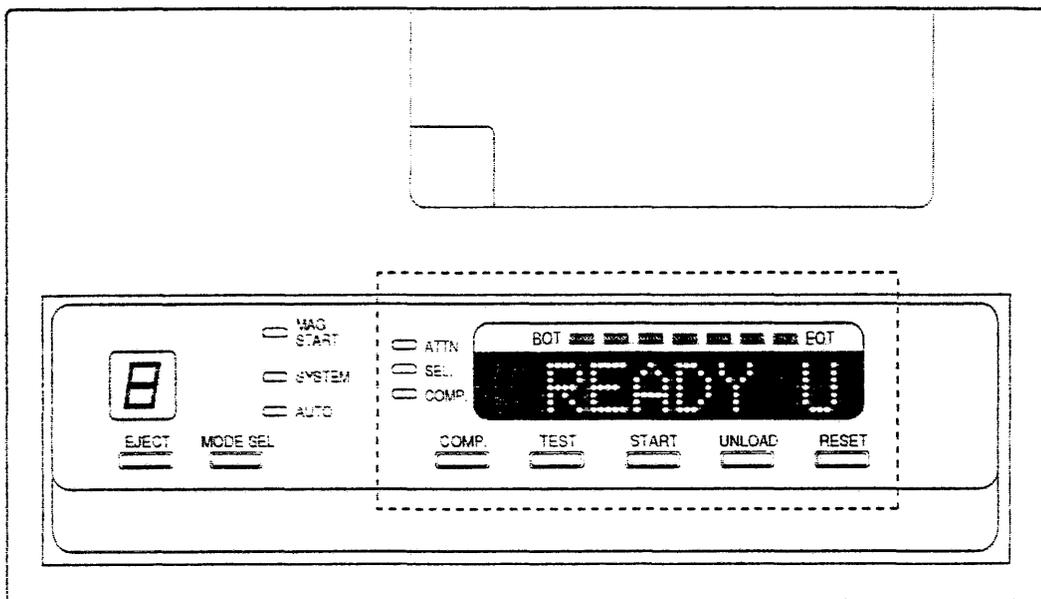


Figure 5-5.  SI2480 Stacker/Loader Front Panel

## Operator Panel Switches

The stacker/loader front operator panel has two additional switches, EJECT and MOD SEL, not available on the tape drive front operator panel. Confirmation messages are displayed when switches are pressed for modes other than the TEST mode.

### EJECT Switch

The EJECT switch is pressed to eject the magazine. The eject operation will automatically unload the cartridge before ejecting the magazine. When the MAG START LED goes off, the switch is valid.

### MODE SEL Switch

The MOD SEL switch is used to select system mode or auto mode. System mode is not used at this time.

### COMP. Switch

See the COMP. switch explanation in Section 5.2, SI2480 Tape Drive.

### TEST Switch

See the TEST. switch explanation in Section 5.2, SI2480 Tape Drive.

### START Switch

When a magazine is used, this switch specifies the start of loading. This switch puts the loader in the START state and the drive in the READY state. With the autoloader in the START state, the MAG START LED goes on.

### UNLOAD Switch

This switch is used to manually unload cartridges and store them in the magazine.

### RESET Switch

The RESET switch puts the equipment in the NOT READY state and the loader in the STOP state. In this state, the MAG START LED goes off, and the TEST, START, UNLOAD, and EJECT switches are made available.

When an error occurs, this switch is used to reset the error.

## Operator Panel Indicators

The stacker/loader operator panel has four LEDs not available on the tape drive operator panel. The four additional LEDs are: a position LED (an LED shown in Figure 5-5 containing the number 8), MAG START, SYSTEM, and AUTO. For the operation of each of the following LED indicators see the corresponding explanation in Section 5.2, SI2480 Tape Drive, in the Operator Panel Indicators subsection:

- ATTN. — Attention LED
- SEL. — Selected LED
- COMP. — Compression LED
- BOT and EOT — Remaining Tape Length LEDs
- Message Display

### Position

This is the LED shown with an 8 in Figure 5-5. This displays the magazine position when the magazine is set. (1 to 9, and 0)

When F (FREE) is displayed, the magazine can be removed. When the magazine is removed, this LED goes off.

When H (HAND) is displayed, it indicates that a cartridge is loaded in the tape drive and that it was loaded by hand, without the magazine.

**MAG START — Magazine Start**

When the magazine is set and the loader is put in the START state using the START switch, the MAG START LED goes ON. When the loader is put in the STOP state by pressing the RESET switch or an error occurs in the magazine, the magazine is completely ejected, and this LED goes off.

**SYSTEM — System LED**

Not used.

**AUTO — Auto LED**

When the autoloader is in the AUTO mode, this LED is on.

## Operation of Stacker/Loader in Auto Mode

To operate the stacker/loader, proceed with the following steps.

1. Press the MODE SEL switch on the SI2480 Stacker/Loader Front Panel shown in Figure 5-5 until the AUTO (auto mode) LED lights up.

2. Insert the magazine.

3. Press the START switch to automatically load the cartridge.

After the last cartridge is unloaded by the UNLOAD command, the drive performs automatic ejection. In this stage, the START LED goes off.

The **system mode** is not used.

### Operation With Magazine Unloaded

When a magazine is unloaded, the operation is manually performed as a model without an autoloader option.

### Other Operations

For other operations see Section 5.2 SI2480 Tape Drive in the subsection Operator Panel Functions.

## 5.4 Initial Power-up Commands

After initial installation, follow these procedures for initial power-up.

1. Verify all power switches are OFF.
2. Verify all PC cards and cables are installed on the controller.
3. Verify all controller cards and cables are installed.
4. Verify switch settings on the SI board for proper configuration.
5. Place unit power switches on front panel of controller to OFF. See Figure 5-1.
6. Put AC power switch to ON.
7. Put the drive(s) power supply AC power switch to ON.
8. Put the ENABLE/DISABLE switch in the ENABLE position. See Figure 5-1.
9. Put unit power on controller front panel to ON. See Figure 5-1.
10. Allow diagnostics to complete.
11. For Storage Director hookup, place the TSI ON-LINE.
12. Verify system messages for on-line status.

## 5.5 Daily Power-up Commands

Procedures for the daily operation of the SI2480 Subsystem follow:

- Turn unit power switch ON.
- Wait for controller diagnostics to complete (panel states IMPL complete or is blank).
  If error message appears, refer to Chapter 6, "Maintenance and Troubleshooting."
- Wait for drive diagnostics to complete (panel shows *).
  If error message appears, refer to Chapter 6, "Maintenance and Troubleshooting."

## 5.6 Power Supply

The operator panel for the drive power supply contains LEDs, voltage adjustment switches, and a main power switch. The function and operation of these devices follow. The drive power supply is shown in Figure 5-6.

### Display LEDs

The drive power supply has three LEDs. These LEDs are described in detail below. Refer to Figure 5-6 for locations.
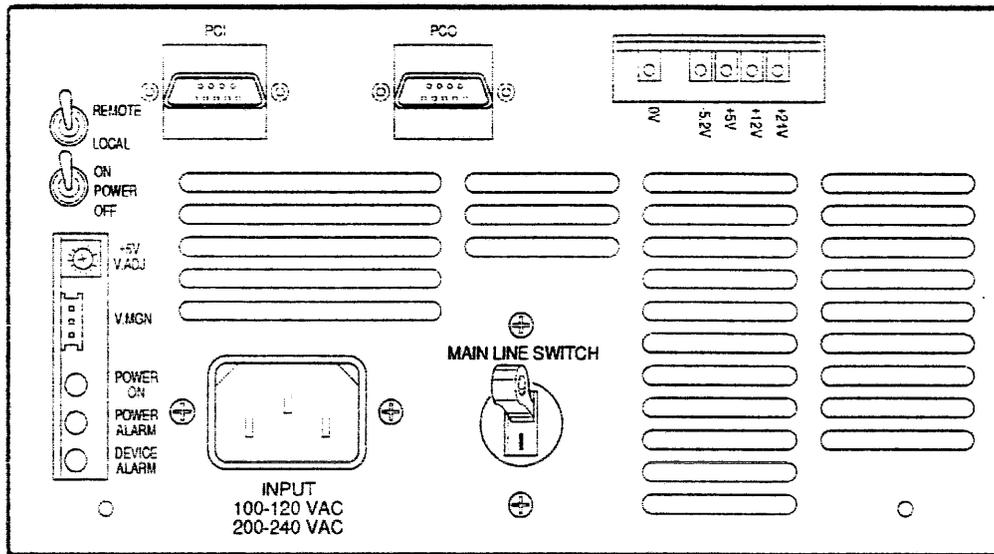
Figure 5-6.  SI2480 Cartridge Tape Drive Power Supply

### POWER ON (amber)

Lights when power is applied.

### POWER ALARM (red)

Power is cut off, and this LED lights when one of the following alarm states is detected:

- Overvoltage/overcurrent or low voltage of +5V power
- Overvoltage/overcurrent or low voltage of –5.2V power
- Overcurrent of +12V power
- Overvoltage/overcurrent or low voltage of +24V power

### DEVICE ALARM (red)

When the drive fails, a fault signal is sent to the power supply to interrupt the power supply and turn this LED on.

## Voltage Adjustment

The +5V VOLT ADJ adjusts the +5V power to a tolerance of ±5%. Clockwise rotation increases its value.

The –5.2V VOLT ADJ adjusts the –5.2V power to a tolerance of ±5%. Counterclockwise rotation increases its value.

## 5.7 SI2480 Cartridge Tape

### External Structure of SI2480 Cartridge Tape

Use ISO type cartridges. Figure 5-7 shows the external structure of the tape cartridge.
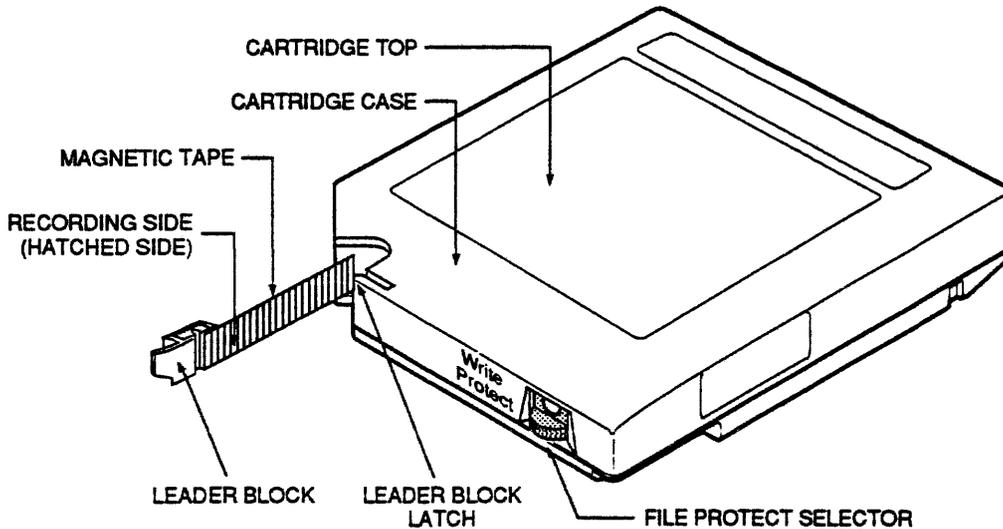


Figure 5-7. External Structure of SI2480 Cartridge Tape

### Cartridge Tape Handling Notes

To ensure reliability and proper operation, handle cartridges carefully, using the notes below for use, storage, transportation, and discarding tapes.

#### Use

Use tapes under the following conditions:

- If a cartridge has been placed for a certain period outside the computer room, it must be left in the computer room for the same period (not exceeding 24 hours) before using it, otherwise condensation may occur in the cartridge. If there is condensation in the cartridge, not only data errors, but unit trouble may result.
- Do not subject the cartridge to dust or high temperatures.
- Do not pile cartridges seven or more high.
- Protect cartridges from shock or vibration.
- Do not remove the leader block, pull the tape out, or press the reel lock, to avoid damaging the tape edge.
- Do not expose the to a magnetic field of 100 oersteds or more.

5-18

## Store

Store cartridges under the following environmental conditions:

- Do not store cartridges for more than three months under the maximum temperature or humidity conditions given in Table 5-8.

Table 5-8 Cartridge Tape Environmental Storage Conditions

| CONDITION | ACCEPTABLE RANGE |
|---|---|
| Temperature | 5 — 32 °C (recommended 22 — 24 °C) |
| Humidity | 5 — 80% RH (recommended 50 — 55%) |
| Maximum wet bulb temperature | 27 °C |

- Store cartridges with the reel side upright. To prevent deformation, do not store cartridges stacked; use the specified storage shelves.

- Do not store cartridges in magnetic fields of 40 oersteds or more (e.g., near a power cable) or exposed to direct sunlight.

- Consider environmental conditions when storing important recorded tape cartridges.

## Transport

Transport the tapes under the following conditions:

- Stack tape cartridges to protect them against shock and vibration. Pack carefully with reel sides upright. The edges of the leader blocks may crack if engaged with each other.

- Transportation environmental conditions are given in Table 5-9. Transported cartridges must not be in transit more than 10 days to maintain environmental conditions. Cartridges exposed to extremely high temperature (e.g., left in a car) may deform.

Table 5-9 Cartridge Tape Transportation Conditions

| CONDITION | RECORDED CARTRIDGE | BLANK CARTRIDGE |
|---|---|---|
| Temperature | 5 — 37 °C | –23 — 48 °C |
| Humidity | 5 — 80% RH | 5 — 100% RH |
| Maximum wet bulb temperature | 27 °C | 27 °C |

## Discard

Discard tapes under the following conditions:

- The tape is chromium dioxide coated. Do not burn the tape.

- Cartridges are consumable supplies. A cartridge is capable of about 15,000 mount operations; however, periodic replacement is recommended.

## Cartridge File Protection

The cartridge tape has a rotary file protect selector that can be easily turned with the finger. When the file protect selector is positioned so that the white round mark can be seen, files are protected, and data write is inhibited. When turned to the position where the white round mark cannot be seen, writing is enabled. The file protect selector must be set at one position or the other. A typical tape cartridge illustrating file protection is shown in Figure 5-8.
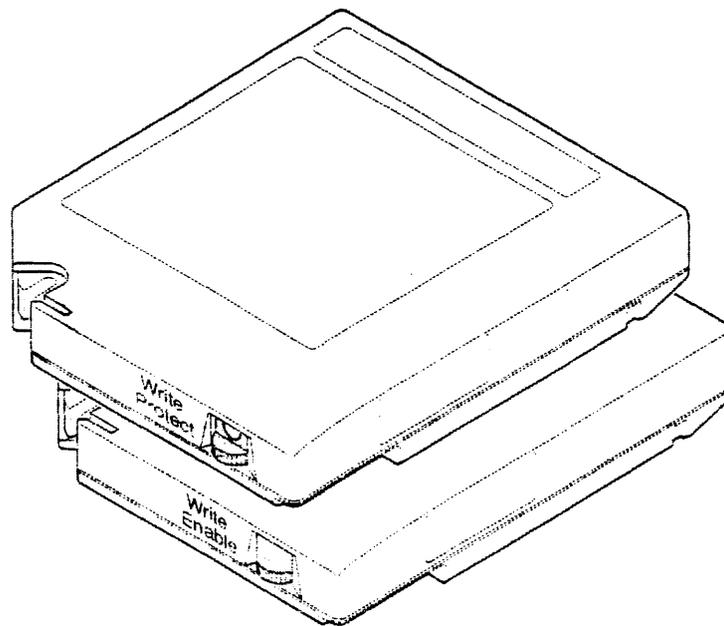
Figure 5-8.  Typical Cartridge With Write Protection Option

**NOTE**

If selector is set between the two positions, file data
protection cannot be guaranteed.

## How to Operate

The Cartridge Tape Drive has an auto-load/auto-unload function. The operator just inserts the cartridge or presses an eject button.

### Loading the cartridge

To load the cartridge, push it into the cartridge entry slot, with the notch on the right, facing the drive, in the direction of the arrow (shown in Figure 5-9 and 5-10) until the cartridge is fully inserted. The cartridge is then loaded automatically.
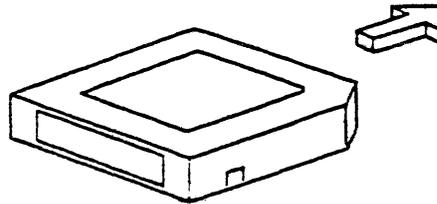
Figure 5-9.  Cartridge Insertion Direction

### Ejecting the cartridge

To eject a cartridge when the drive is not ready, press the UNLOAD switch.

To eject a cartridge when the drive is ready, press the RESET switch to set the not ready state, then press the UNLOAD switch.

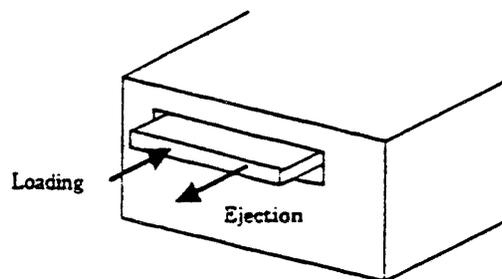The cartridge is ejected automatically. See Figure 5-10.

Figure 5-10.  Cartridge Loading/Ejecting

## Fault Recovery

When a cartridge cannot be loaded or unloaded successfully, an error code or error message is displayed. If pressing the UNLOAD switch does not clear the error condition and causes the cartridge to eject, the drive is defective and should be left in its current state. Never try to force a cartridge out of the drive as this can damage both the tape and the drive.

If an error occurs while the tape is running, an error code is displayed. Log the error code and report it to a field engineer. Cartridge removal should be performed as mentioned above.

If a DRIVE ERROR is reported, make sure the following conditions have not occurred.

1. A tape cartridge with a metal seal is inserted into a drive that is not configured for the data compression option.

2. An attempt is made to read a tape with compressed data on a drive that is not configured for the data compression option.

**NOTE**

Make sure metal indicators are applied to cartridges running in the data compression mode.

## Magazine Cartridge Operation

There are two kinds of unlocking methods for the magazine cartridges.

1. To get a single cartridge, push the unlock button on side of magazine.

2. To get the whole magazine of cartridges, press the lock bar on the top of the magazine.

To select **file protection** on all cartridges in the magazine, slide the **file protect** switch, located on the bottom backside of magazine, to the locked position.

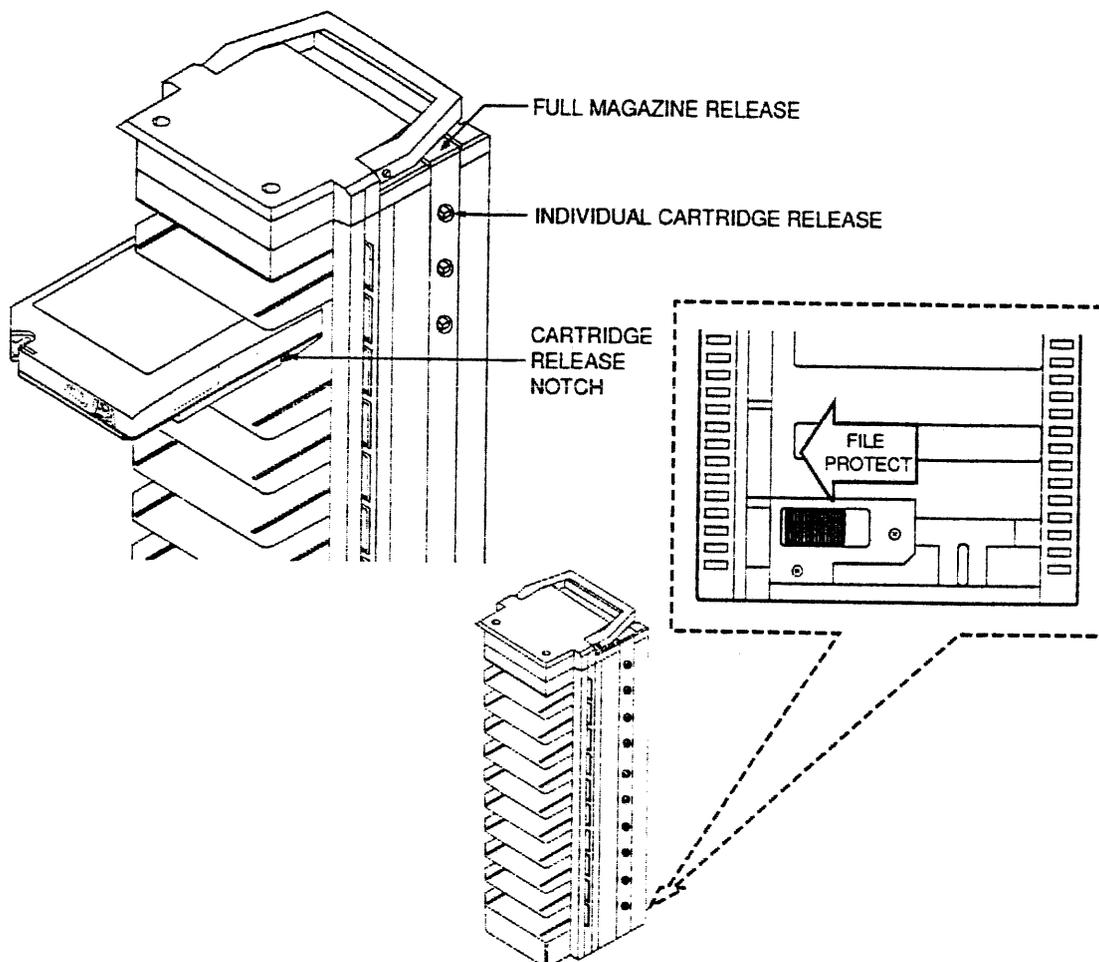The locking mechanisms for the magazine are shown in Figure 5-11.

Figure 5-11. Magazine Locking Mechanism Locations

## 5.8 Cleaning Tape

To clean the tape path of the drive, use a cleaning cartridge (available from your System Industries sales representative — see the illustrated parts in Chapter 7 for the part number). Just insert the cleaning cartridge; cleaning will be performed automatically.

Cleaning is needed when the message *CLEAN is displayed on the operator panel. However, it is recommended to clean at intervals shown in Table 5-10 according to the number of cartridges processed in a day regardless of the cleaning message.

Table 5-10 Cleaning Frequency of Cartridge Tape

| CARTRIDGES USED PER DAY | CLEANING PERIOD |
|---|---|
| 5 | Once every two weeks |
| 10 | Once a week |
| 50 | Every day |

### Cleaning Cartridge

The construction of a cleaning cartridge is similar to a data cartridge. Figure 5-12 shows the cleaning cartridge's identification groove. Figure 5-13 shows a typical cleaning cartridge label.

**NOTE**

Use cleaning cartridges in accordance with the manufacturers instructions.



Figure 5-12.  External Structure of Cleaning Cartridge

### Procedure for Cleaning

When cleaning is required a message *CLEAN is displayed on the operator panel.

The cleaning procedure is as follows:

1. Insert the cleaning cartridge.
2. Wait. When cleaning is finished, the cleaning tape is rewound and ejected automatically. (Cleaning time is about 60 seconds.)



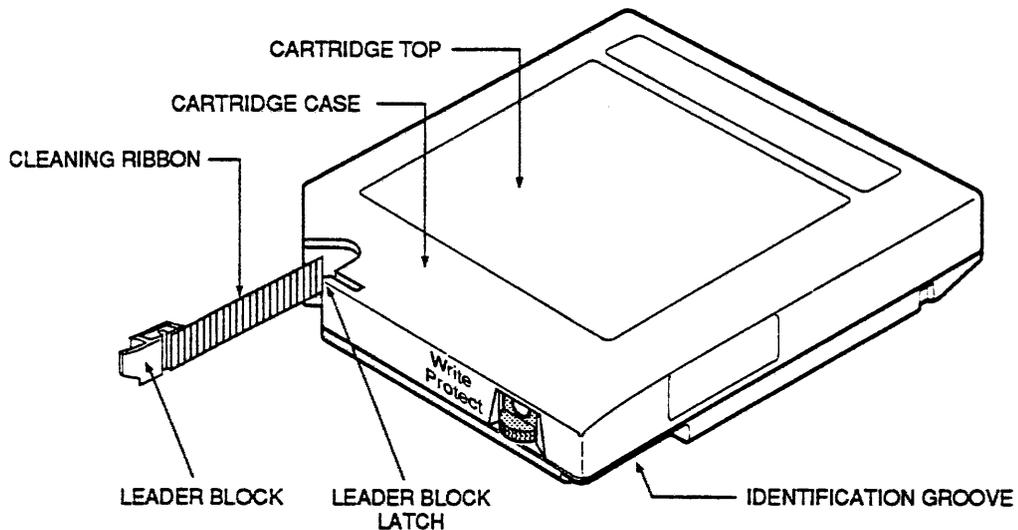Figure 5-13.  Cleaning Cartridge Label

# 6
# MAINTENANCE AND TROUBLESHOOTING

This section describes the maintenance procedures, subsystem troubleshooting solutions, diagnostic tools, and removal and replacement procedures for field replaceable units (FRUs) in the SI2480 Cartridge Tape Subsystem. These units, along with their part numbers, are listed in the "Illustrated Parts Catalog."

## 6.1 Preventive and Routine Maintenance

The subsystem is designed for long-term, error-free, operation and allows for user-initiated maintenance. Comprehensive self-diagnostics are an integral part of the subsystem and are easily invoked by the user.

Maintenance on the controller consists primarily of isolating troubles and replacing FRUs. Most troubleshooting is accomplished by use of the front panel. Refer to the vendor manual for a complete breakdown of maintenance procedures.

Maintenance on the drive is not required except for cleaning the tape path with a cleaning cartridge. Refer to the vendor manual for the cleaning schedule.

## 6.2 System Troubleshooting

Diagnostics indicate the state of the system and identify any malfunctioning areas. Both the controller and drive diagnostics are discussed in this section. For a complete breakdown of troubleshooting procedures, refer to the vendor manual.

### Controller Start-up Diagnostics

The power-on diagnostics, which consist of the Go/No Go tests and the off-line routines, are executed automatically whenever power is applied to the controller. Execution of the power-on diagnostics is entirely automatic, except for starting the operation. There are no options or parameters to control the power-on diagnostics.

In the event of a failure detected by the power-on diagnostics, the CHECK LED on the operator panel lights. Refer to the vendor manual for a more detailed explanation.

## Controller Off-line Diagnostics

Off-line diagnostics are run when the tape controller is not on-line. The interface switch must be in the DISABLED position, and the unavailable LED must be on. Off-line diagnostics are only run through the front maintenance panel.

Execution of Off-line diagnostics is controlled by entering run options and parameters. The run options allow the user to select operations such as loop tests or continue on error. The parameters allow the user to select an individual test or group of tests to be executed. For detailed instructions for this capability, refer to the vendor manual.

## SI2480 Cartridge Tape Drive Diagnostics

Diagnostic tests available for the SI2480 Drive consist of power-up self-tests, on-line diagnostics, and system error logs for determining fault information. For detailed instructions for these functions, refer to the vendor manual.

When troubleshooting cartridge tape subsystems, refer to the following checklist:

- Check if the unit is receiving power; if not, check the power cables and fuses.

- Try a transfer to and from the drive. If you can read but not write, see if write protection is enabled.

- If available, run the cartridge tape drive off-line diagnostics package. If the drive passes the test, check the controller and interconnects.

- Clean tape transport with an approved cleaning kit, which is available from Systems Industries.

- Check for loose cables, poorly attached connectors, and bent pins.

- Check jumpers, switch settings, and the host computer system configuration file.

### *Power-up Self-tests*

During Power-up initialization, the SI2480 Tape Drive performs self-tests. The LEDs on the front panel light while tests are in progress. Refer to the vendor manual for a more detailed explanation.

**On successful completion of self-tests,** the LEDs turn off, and the tape drive is ready for operation.

**If the self-tests fail,** error codes flash on the control panel. In this case, refer to the vendor manual for detailed test procedures.

**Cartridge Tape Fault Recovery**

When the cartridge cannot be loaded or unloaded successfully, an error code or error message is displayed. This state is recovered by pressing the UNLOAD switch. When the error state is recovered, the cartridge is ejected. The cartridge can now be reloaded. When the cartridge does not unload after pressing the UNLOAD switch, the drive is defective.

<div align="center">

**NOTE**

Never try to force the cartridge out of the drive. Doing so
could damage the tape or the drive.

</div>

If an error occurs while the tape is running, an error code is displayed. Refer to the vendor manual for more detailed information.

## 6.3 SI2480 Controller Removal and Replacement

The removal and replacement procedures for the SI2480 Subsystem Controller follow:

### Controller Power-down Sequence

Before starting removal and replacement procedures, make sure the following procedure is completed.

1. Make sure ESD protection is worn.

2. Disable host access to the drive and/or tape subsystem.

3. Power off the drive and/or tape subsystem.

4. Disconnect the SI2480 Chassis at the Controller.

5. Disconnect the drive power cord from the PDU.

6. Remove I/O cables from chassis.

### SI2480 Controller

Removal and replacement procedures for the SI2480 Controller are listed below. A detailed illustration is given in Figure 6-1.

*Removing a controller:*

1. Follow power-down sequence listed previously.

2. Remove cables from back of controller chassis.

3. Remove controller from cabinet.
   - Remove the two retaining screws at rear of sleeve connecting controller chassis to sleeve. Save the screws for replacing chassis.
   - Pull controller out of chassis sleeve. Release safety catch on back, inside of chassis. Place controller chassis on a flat, stable surface.

***Replacing a controller:***

1. Check address and jumper settings for proper configuration. Refer to "Installation" for correct settings.

2. Replace chassis into sleeve.

   - Slide the controller back until it locks into place.
   - Replace two retaining screws previously removed.

3. Mount the front panel to the cabinet.

4. Attach cables to controller.

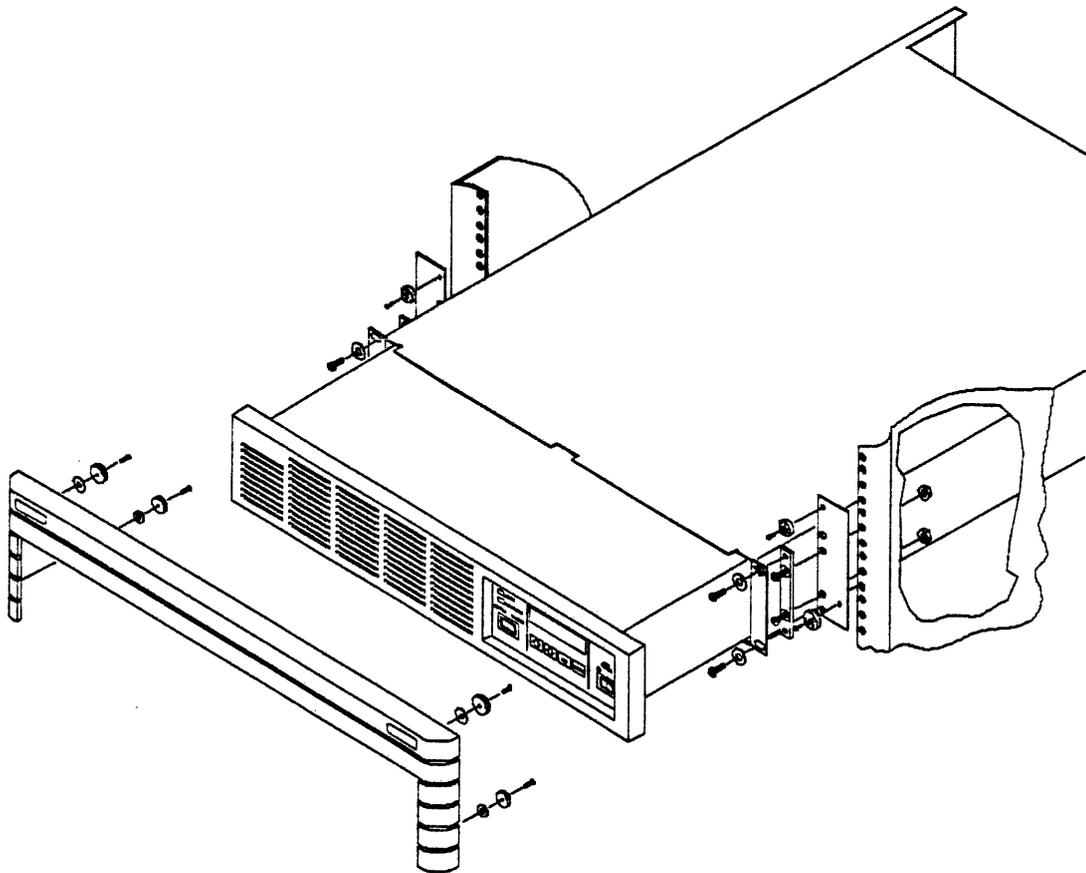5. Power-up controller. Run start-up diagnostics.

Figure 6-1. SI2480 Controller Removal and Replacement

## 6.4 SI2480 Tape Drive Removal and Replacement

The procedures below are for the removal and replacement of the SI2480 Subsystem Tape Drive and power supply.

## Drive Power-down Sequence

Before starting removal and replacement procedures, make sure the following procedure is completed.

1. Unload any tapes in the cartridge slot.

2. Turn off the drive power from the back panel of the chassis.

3. Turn the power off on the controller front panel.

4. Disconnect the SI2480 Chassis at the Controller.

5. Disconnect the AC power cord from the rear of the drive chassis.

## SI2480 Tape Drive

When an SI2480 Cartridge Tape Drive is not installed at the factory, a metal plate is attached to the chassis where the drive should be placed. When installing a second tape drive to the SI2480 Drive Chassis, remove the two screws attaching this plate.

For cabling information on the drives, refer to "Installation." The removal and replacement of the 2480 Drive Chassis is shown in Figure 6-2.

*Removing an SI2480 drive:*

1. Follow power-down sequence listed previously.

2. Extend the chassis out from the cabinet. Release locking mechanism at back.

3. Place the drive chassis on a flat, stable surface.

4. Remove the screws holding the drive in place.

5. Remove the cabling from the drive to the power supply.

6. Remove the drive.

**Replacing an SI2480 drive:**

1. Attach drive to chassis with screws.

2. Attach cables from power supply to drive.

3. Replace drive chassis into sleeve.

4. Slide the drive chassis back until it locks into place.

5. Replace two retaining screws previously removed.

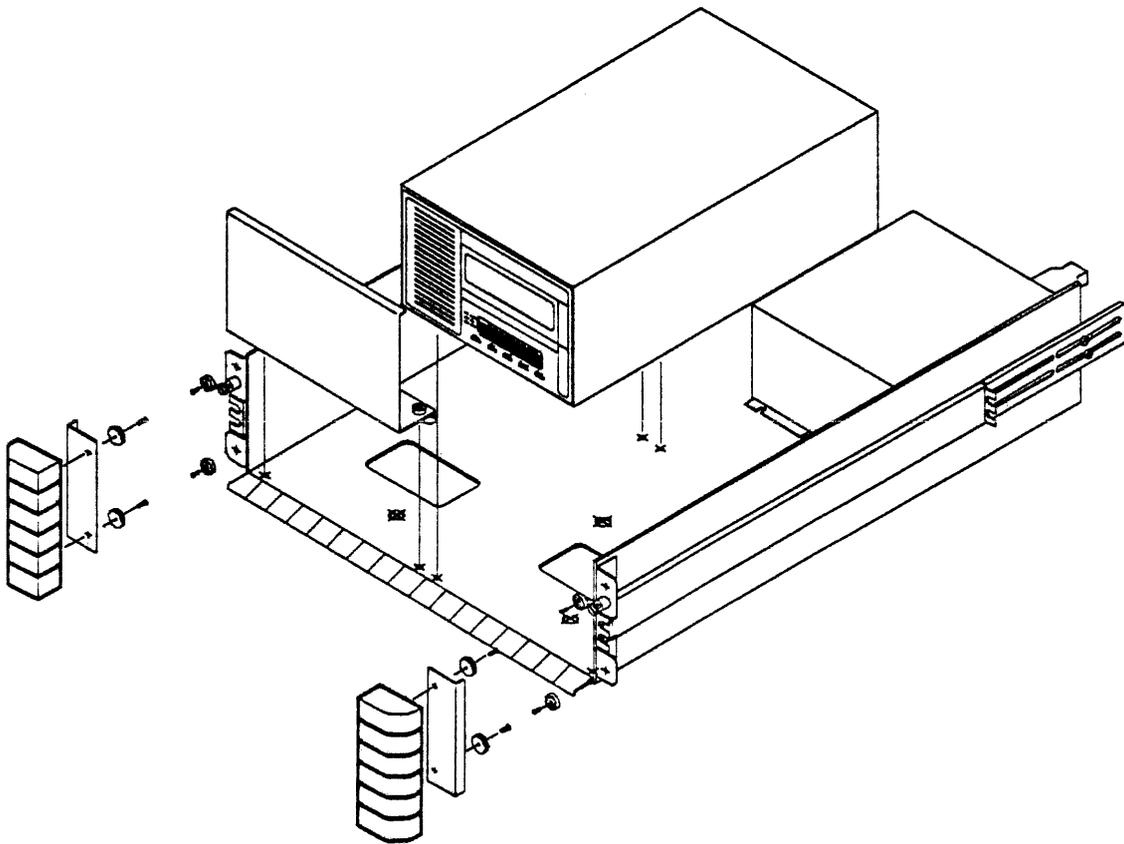6. Attach cables from drive chassis to controller.

Figure 6-2. SI2480 Drive Chassis Removal and Replacement

### *SI2480 Drive Chassis Power Supply*

Removal and replacement procedures for the SI2480 Drive Chassis Power Supply are listed below. For cabling power supply to drives, refer to vendor manual.

### *Removing a power supply:*

1. Follow power-down sequence listed previously.
2. Remove cables from back of drive chassis.
3. Extend the chassis out from the cabinet. Release locking mechanism at back.
4. Place the drive chassis on a flat, stable surface.
5. Remove the screws holding the power supply in place.
6. Remove the cabling attaching the power supply to the drive.
7. Remove the cabling attaching the power supply to the chassis.

### *Replacing a power supply:*

1. Attach power supply to chassis with screws.
2. Attach cables from drive to power supply.
3. Attach the cabling from the power supply to the chassis.
4. Replace chassis into sleeve.
   - Slide the controller back until it locks into place.
   - Replace two retaining screws previously removed.
5. Attach cables from drive chassis to controller.

## 6.5 SI2480 Stacker/Loader Removal

Before removing the stacker/loader, make sure to power-down the subsystem using the procedures previously listed.

For a detailed illustration of removal procedures, refer to Figures 6-3 and 6-4.

### *Remove stacker:*

1. Pull stacker out of loader by the handle.

### *Remove cables, drive, and covers:*

1. Remove cables from back of drive.
2. Lift drive to expose side of top cover frame. **Loosen** four screws holding drive to chassis. Do Not Remove Screws.
3. Remove four screws attaching drive mounting plate and drive to chassis; SAVE.

4.  Remove two roundhead screws from rear of cover attaching drive cover.

5.  Remove EPROM and replace with old EPROM. The EPROM is located at the front of the tape drive board.

6.  Remove two screws attaching top cover to loader. Remove cover.

### Remove loader from baseplate:

1.  Remove three flathead screws from top of baseplate.

2.  Remove four flathead screws from bottom of baseplate.

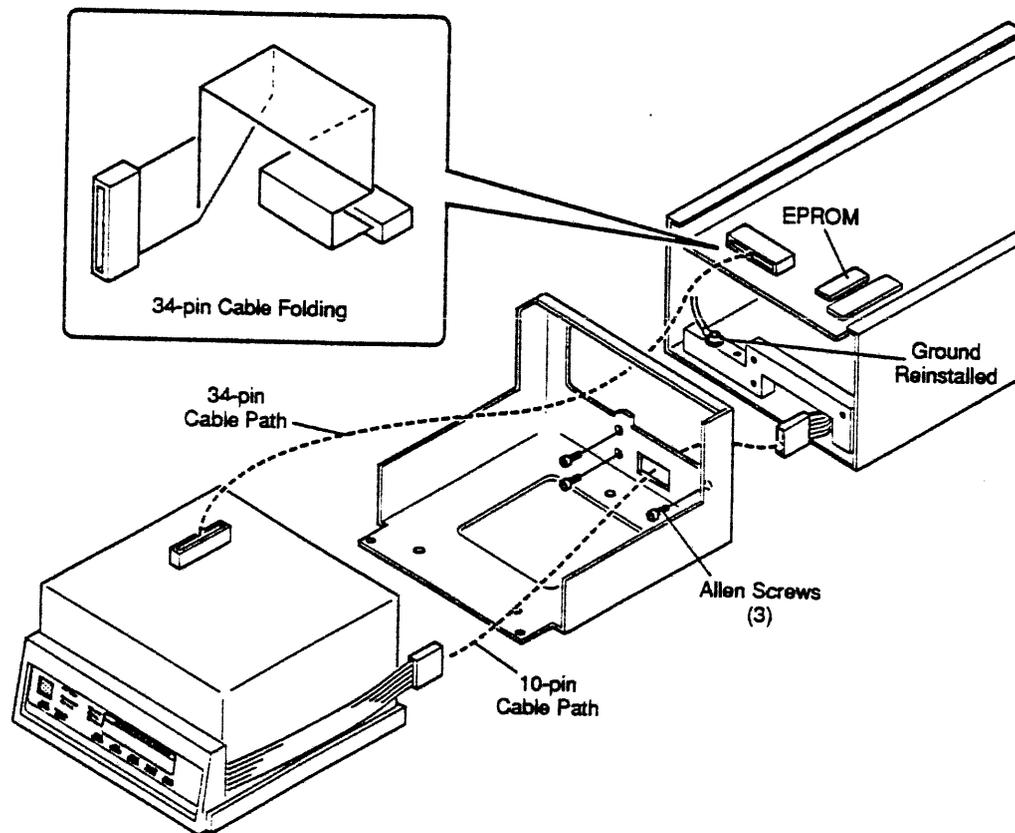3.  Pull loader out about half-way.



Figure 6-3. SI2480 Stacker/Loader Removal

4.  Remove 34-pin cable connecting loader PCA board to drive.

5.  Remove cable from back of loader front operator panel.

6.  Remove loader.

### Remove loader baseplate from drive:

1.  Remove three allen bolts from drive front attaching loader baseplate.

2.  Remove front panel cable from slot in baseplate.

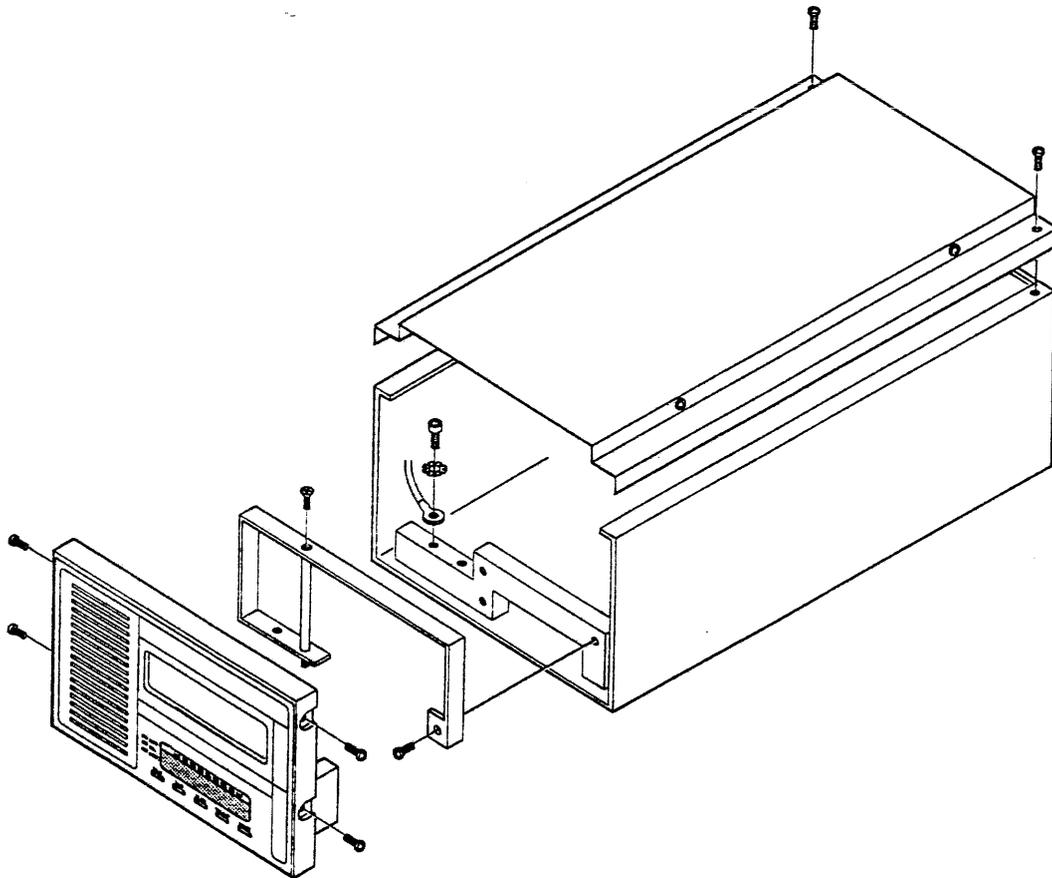3.  Remove 34-pin cable from top of drive board.

Figure 6-4.  SI2480 Stacker/Loader Removal (front panel)

### *Replace drive front panel:*

1. Remove grounding wires, hex screw, and star washer from drive. SAVE for replacement procedures.

2. Replace front panel frame by screwing rod into drive front.

3. Replace the BIG roundhead screw to attach the frame to the base of the drive.

4. Replace grounding wires, hex screw, and star washer to drive.

5. Replace the top flathead screw attaching the rod to the front panel frame.

6. Attach the 10-pin female connector to the back of the drive front panel.

7. Replace the four screws attaching the operator panel to the drive.

### *Replace drive to chassis:*

1. Attach top cover of drive with two roundhead screws. Lift drive up slightly, and tighten side screws previously loosened.

2. Replace four flathead screws attaching drive mounting plate and drive to chassis.

3. Recable drive to chassis.

4. Power-up chassis.

## 6.6 Power Supply Voltage Conversion

The power conversion option for the 2480 Controller and the 2480 Drive Chassis is explained in the following paragraphs.

## 2480 Controller Power Conversion

To convert power on the 2480 Controller, jumper selection must be changed. To change power from 110 VAC to 220 VAC, do the following steps. The controller power conversion jumper is shown in Figure 6-5.

1. Follow power-down sequence listed previously.

2. Extend the chassis out from the cabinet.

3. Remove two screws connecting power supply to chassis.

4. Remove six screws attaching power supply cover; remove cover.

### NOTE

Power supply must be lifted to remove screws attaching cover. **DO NOT UNCABLE** power supply.

5. Remove three-prong unit from jumper JP1 and attach to jumper JP2.

6. Replace power supply cover with screws.

7. Attach power supply to chassis with two screws previously removed.

8. Remove label on back of chassis. Replace with label in conversion kit, "Configured for 240 VAC."

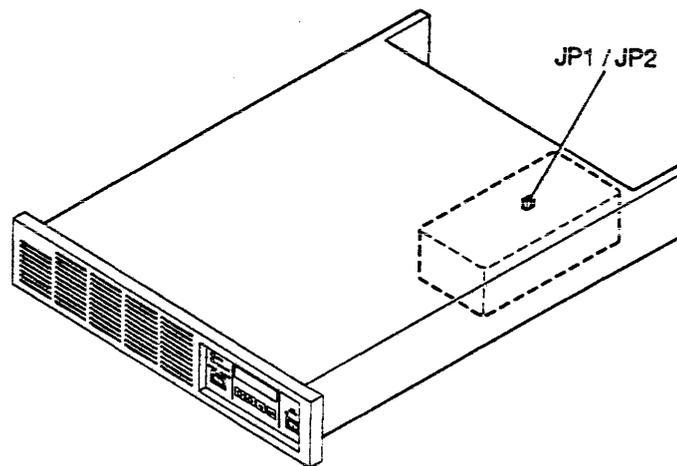9. Push chassis back into cabinet until it locks in place. Reapply power.

Figure 6-5. SI2480 Controller Power Conversion

## 2480 Drive Power Conversion

The 2480 Drive accepts any range of power from 100 - 240 VAC automatically. The only restriction is the type of power cord attached to the back of the chassis.

- For AC voltage between 100 - 120 VAC, use a standard power cable.

- For AC voltage between 200 - 240 VAC, use required 230 VAC power cord. To order, refer to "Illustrated Parts."
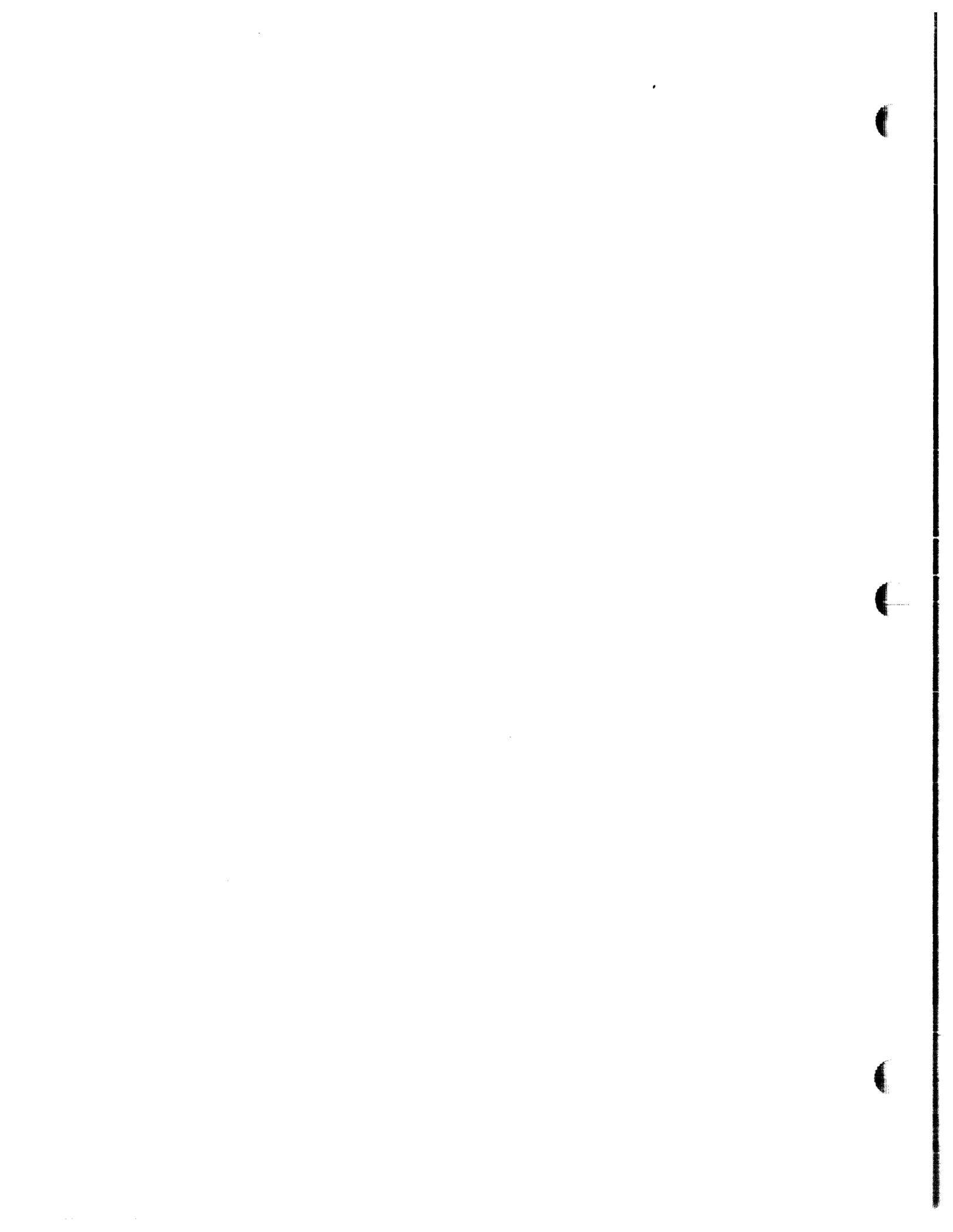
# 7
# ILLUSTRATED PARTS CATALOG

The SI2480 Subsystem Field Replaceable Units (FRU) are listed in Table 7-1. The SI2480 Subassembly components are shown in Figure 7-1.

Table 7-1. SI2480 Field Replaceable Units

| ITEM | NO. INCLUDED | PART NUMBER |
|---|---|---|
| SI2480 Subassembly | | |
| M2481A 1.5 Mbyte Tape Drive | 1 each | 982-2507 |
| M2481B 3.0 Mbyte Tape Drive | 1 each | 982-2530 |
| SI2480 Drive Blank Adapter Plate | 1 each | 8100-1001 |
| M1016A 1.5 Mbyte Controller | 1 each | 982-2506 |
| M1016B 3.0 Mbyte Controller | 1 each | 982-2529 |
| Power Supply Assembly | 1 each | 982-2505 |
| Cable Assembly (storage director) | 1 each | 8100-7002 |
| Cable Kit (controller to drive) | 1 each | 982-2519 |
| Cable Kit (drive to drive) | 1 each | 982-2527 |
| Power Conversion Kit (110 to 220) | | |
| SI2480 Controller | 1 each | 8100-7018 |
| SI2480 Drive | 1 each | 8100-7019 |
| Stacker/Loader Assembly | 1 each | 982-2502 |
| 5-Cartridge Magazine Kit | 1 each | 982-2512 |
| 10-Cartridge Magazine Kit | 1 each | 982-2511 |
| Data Compression Option | 1 each | 982-2508 |
| Controller Terminator | 1 each | 982-2518 |
| Drive Terminator | 1 each | 982-2520 |
| Blank Cartridge | 1 each | 982-2510 |
| Cleaning Cartridge | 1 each | 982-2517 |

Tape Cartridge

Controller
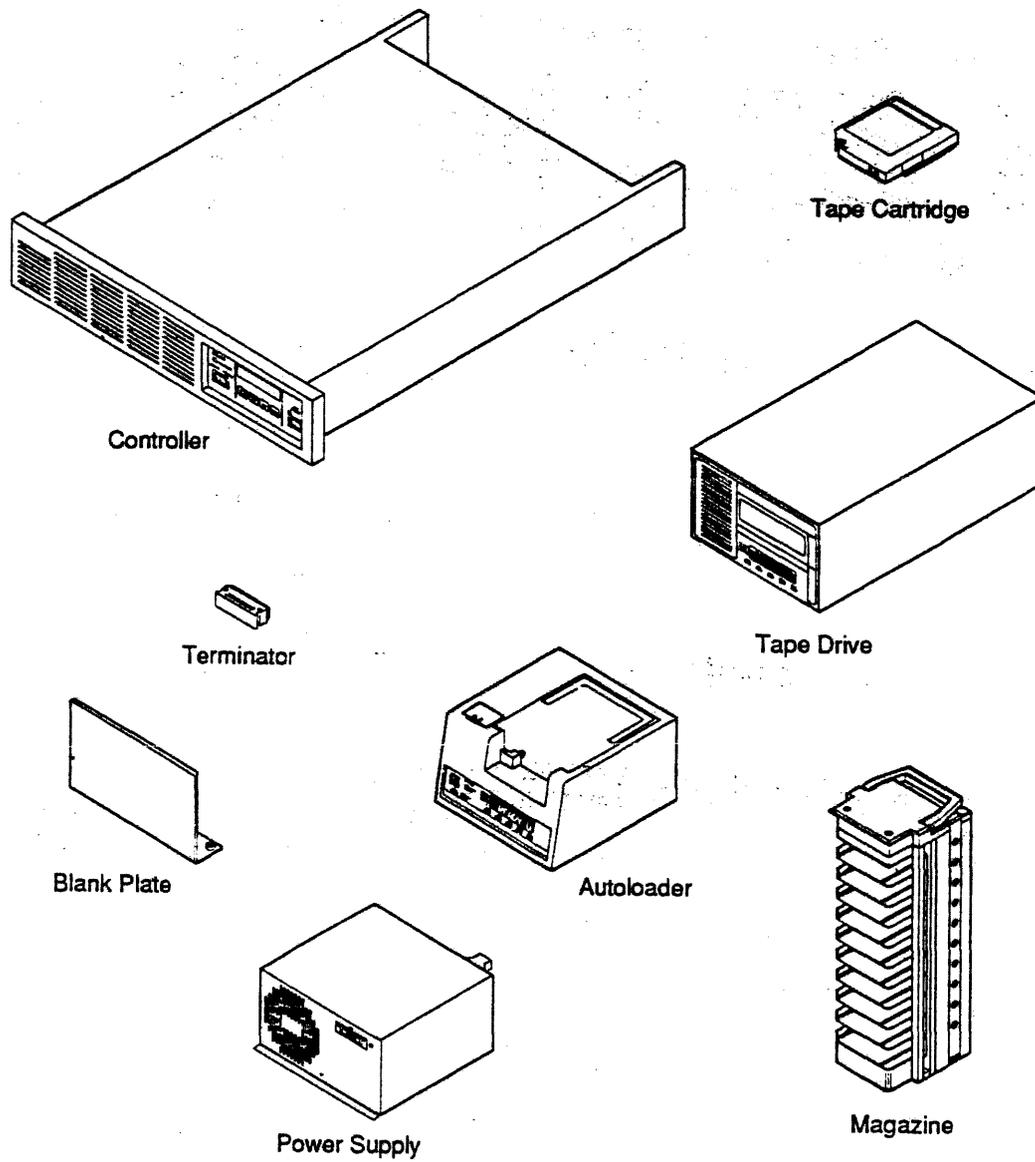
Tape Drive

Terminator

Blank Plate

Autoloader

Power Supply

Magazine

Figure 7-1. SI2480 Subassembly Components